eISSN 2413-9009

PATH OF SCIENCE

TRAEKTORIÂ NAUKI

International Electronic Scientific Journal

Vol. 9, No 1, 2023

AGRIS
CAB Abstract
CEEOL
CEJSH
Dialnet
DOAJ
EBSCO
FSTA®
Index Copernicus
RePEc
CNKI Scholar
Ulrich's Periodical Directory

pathofscience.org

ISSN 2413-2009 (ONLINE)

TRAEKTORIÂ NAUKI = PATH OF SCIENCE

Vol. 9 No 1 2023

Founded in August 2015. Publishing monthly.

Publisher Altezoro, s.r.o. & Dialog
4B, Južná trieda, Košice mestská časť Juh, 04001, Slovak Republic
Ph.: (421) 905-38-36-97.

Founders: Altezoro, s.r.o., 4B, Južná trieda, Košice mestská časť Juh, 04001, Slovak Republic
Publishing Center "Dialog", 2 Club Street, Solonitsevka, 62370, Ukraine

The journal is abstracted in the following international databases: AGORA, AGRIS, AiritiLibrary, Baidu Scholar, Bielefeld Academic Search Engine (BASE), CAB Abstract, Central and Eastern European Online Library (CEEOL), Food Science and Technology Abstracts, Index Copernicus (ICV 2021 = 100,0), Google Scholar, J-Gate, OpenAIRE, Polska Bibliografia Naukowa, ResearchBib, ScienceOpen, The Central European Journal of Social Sciences and Humanities (CEJSH), Türk Eğitim İndeksi, Ulrichsweb Global Serials Directory, WorldCat.

Editor in Chief: Kataiev A., PhD, Ass. Prof.

Editorial Board:
Aksenova E., PhD, Ass. Prof.
Bobro N., PhD, Ass. Prof.
Bolotnaya O., PhD, Ass. Prof.
Holoborodko K., Doctor of Science, Prof.
Holubov A., PhD, Ass. Prof.
Horoshev A., PhD, Ass. Prof.
Khytra O., Doctor of Science, Prof.
Kniaz S., Doctor of Science, Prof.
Kolos N., Doctor of Science, Prof.
Krupin V., PhD, Ass. Prof
Malenko E., Doctor of Science, Prof.
Mygal S., PhD, Prof.
Olipas C. N. P., PhD
Palchyk O., PhD, Ass. Prof.
Shatrovskiy A., PhD, Ass. Prof.
Skrynkovskyy R., PhD, Prof.
Yuzevych V., Doctor of Science, Prof.
Zelenskaya L., Doctor of Science, Prof.

Editorial office 1: 4B, Južná trieda, Košice mestská časť Juh, 04001, Slovak Republic
Editorial office 2: 2 Club Street, Solonitsevka, 62370, Ukraine
E-mail: editor@pathofscience.org. Site: http://pathofscience.org

The journal is an international open-access, peer-reviewed electronic journal created to fully and promptly meet the information needs of society in the knowledge gained in the course of research and development, research and design, design and technology and production activities of scientists and experts.

The journal publishes original research papers, review articles, and short communications papers on social, technical, natural sciences, and the humanities. The scope of problems of articles is not limited.

Responsibility for facts, quotations, private names, enterprises and organizations titles, and geographical locations is to be barred by the authors. The editorial office and board do not always share the views and thoughts expressed in published articles.

© Path of Science, 2023

TABLE OF CONTENTS

SECTION “ENGINEERING, MANUFACTURING AND CONSTRUCTION”

Udemgba Chinonso Stanley, Amarachi Anyawu Solace, Amaefule Excel Obumneme, Odoemelam Patience Ogechi, Odo Godfrey Ifeanyi, Okam Chukwu Emmanuel, Nnaemeka Nwachuckwu Chukwudi, Sandra Ijeoma Izuchukwu, Iheanacho Eberechi Clement, Ogbonna Chiemezuo Chinedu, Sunday Okechukwu, Moses Chukwuebuka Okwudifele
Prediction of the Phytochemical Properties of Luffa Cylindrica Seed Oil Using Artificial Neural Network ……. 1001
(Language – English) 1010

Roman Mysiuk, Volodymyr Yuzevych
Recover Data about Detected Defects of Underground Metal Elements of Constructions in Amazon Elasticsearch Service ……. 1011
(Language – English) 1019

SECTION “EDUCATION”

Cris Norman Olipas
A Sentiment Analysis Approach on the Acceptance of Radio Frequency Identification Technology-Based Solutions among Schools in Nueva Ecija, Philippines …… 2001
(Language – English) 2007

Cris Norman Olipas
The Knowledge, Attitude, and Practice of Core Values in a Learning Institution in the Philippines: A Basis for a Plan of Action ……. 2008
(Language – English) 2019

Sulisyan, Cut Zahri Harun, Nasir Usman
The Effect of Teacher Performance and Teacher Work Motivation on Student Learning Motivation at Bungoeng Seroja Elementary School Cluster in Banda Aceh, Indonesia …… 2020
(Language – English) 2026

Mardiana, Nasir Usman, Khairuddin
Implementation of Teacher Working Group Training Program Using the Blended Learning Model in Cluster 1 Krueng Sabee, Aceh Jaya District, Indonesia …… 2027
(Language – English) 2034

Chimezie Prince Ochionuoha
Effectiveness of Internet Accessibility on Academic Activities of Open and Distant Learners in the National Open University of Nigeria ……. 2035
(Language – English) 2043

Sapri, Sudirman, Fahruddin
Planning in the Implementation of School Operational Assistance in Regular SMPN and SATAP in Praya Barat District, Indonesia ……. 2044
(Language – English) 2047

Syarifah Hardiyanti [1], Nasir Usman [1], Yusrizal
Situational Leadership of the School Principal in Improving Teacher's Pedagogic Competence In Kindergarten Gugus 2 UPTD 1 Johan Pahlawan, West Aceh District, Indonesia ……. 2049
(Language – English) 2056

Khaerul Rahman Akbar, Asrin, Lalu Sumardi
School Planning in Improving the Quality of Graduates of SMPN 3 Mataram, Indonesia ……. 2057
(Language – English) 2062

Nasrun, Sudirman, Asrin
The Influence of Work Discipline on the Quality of Private School Principles in East Lombok, Indonesia …… 2063
(Language – English) 2066

Afjur, Sudirman Willian, Sudirman
Servant Leadership School Principles in Improving Teacher Performance at SMPN 7 Mataram, Indonesia ……. 2067
(Language – English) 2071

Palli Poti, Joni Rohkmat, Lalu Muhaimi
The Role of Educators and Education Personnel in Increasing the Quality of Education in STKIP Weeetebula, Indonesia …… 2072
(Language – English) 2077

Sulhiyah, Agil Al Idrus, Lalu Sumardi
Management of Elementary School Facilities in Lingsar, West Lombok District, Indonesia Viewed from Planning Aspects ……. 2078
(Language – English) 2084

SECTION “LAW AND SECURITY”

Andrew Gitau Kimani
Measures by Organisations to Counter Challenges in the Use of Information Technology in Protecting Personal and Business Data in Nairobi County, Kenya …… 3001
(Language – English) 3007

Dadang Hartanto
Strengthening the Police Institutional System in Eradicating Narcotics Crime in the North Sumatra Regional Police, Indonesia …… 3008
(Language – English) 3013

Noval Dwi Kurnia, Muhammad Sood, Hirsanuddin
Juridical Study of Arrangements for Authentic Deeds through Cyber Notary: Comparative Study with Japan ……. 3014
(Language – English) 3022

Ni Ketut Indah Primadani, Djumardin, Aris Munandar
Comparison of Legal Authority of Notary and Electronic Signature Validity in Indonesia and the United States of America ……. 3023
(Language – English) 3030

John K. Simiyu
The Effectiveness of Multi-Agency Operation Leadership in Mitigating Insecurity in Lamu County, Kenya …….. 3031
(Language – English) 3036

SECTION “ECONOMICS”

Nadya Betari Karlinda, Sulhaini, Baiq Handayani Rinuastuti
The Effect of Instagram Content Quality on Fomsumerism Behavior with Emotional Response as a Mediating Variable …… 4001
(Language – English) 4009

Maryna Pravdiuk
Forms of Non-Standard Employment in the Context of the Transformation of Business Processes in Modern Conditions ……. 4010
(Language – English) 4016

SECTION “LANGUAGES”

Ruslan Serdeha
Polysemy of Proper Names in the Language of Folklore and the Problem of Its Reflection in the “Dictionary of the Language of Oral Folklore” …… 5001
[Полісемія власних назв у мові фольклору та проблема її відбиття у «Словнику мови усної народної словесності»] 5009
(Language – Ukrainian)

Aysel Eldar Soltanova
The Main Factors Leading to Code-Switching in Azerbaijan ……. 5010
(Language – English) 5015

Ogtay Dilbar Bashirova
Formation and Development of Ethnic-Toponyms in the Territory of Azerbaijan ……. 5016
[Формирование и развитие этно-топонимов на территории Азербайджана] 5022
(Language – Russian)

SECTION “BIOLOGY AND ENVIRONMENTAL SCIENCES”

Ismail Muhammad, Tanko Mahmoud Mohammed, Asiya Muhammad Usman, Bala Abubakar
Comparative Analysis of the Effectiveness of Polymerase Chain Reaction and Microscopy in Malaria Diagnosis …… 6001
(Language – English) 6009

Oksana Palchyk
Overview of the Peculiarities of Social Learning of Representatives of the Genus Corvus ……... 6010
[Огляд особливостей соціального навчання представників роду Corvus] 6017
(Language – Ukrainian)

SECTION “PHYSICS”

John M. Gitonga, Simon W. Mugo, James M. Ngaruiya
Determination of Gold Nanoparticle Sizes from Their Plasmon Resonance within the Optical Spectrum …… 7001
(Language – English) 7005

Prediction of the Phytochemical Properties of Luffa Cylindrica Seed Oil Using Artificial Neural Network

Udemgba Chinonso Stanley [1], Amarachi Anyawu Solace [2], Amaefule Excel Obumneme [1], Odoemelam Patience Ogechi [1], Odo Godfrey Ifeanyi [1], Okam Chukwu Emmanuel [1], Nnaemeka Nwachuckwu Chukwudi [1], Sandra Ijeoma Izuchukwu [1], Iheanacho Eberechi Clement [1], Ogbonna Chiemezuo Chinedu [1], Sunday Okechukwu [1], Moses Chukwuebuka Okwudifele [1]

[1] *Michael Okpara University of Agriculture*
P. M. B. 7267 Umuahia Umudike, Abia State, Nigeria

[2] *Université de Poitiers*
15, rue de l'Hôtel Dieu – TSA 71117 – 86073 POITIERS Cedex 9, France

DOI: 10.22178/pos.89-2

LCC Subject Category: TP1-1185

Received 16.12.2022
Accepted 28.01.2023
Published online 31.01.2023

Corresponding Author:
Excel Obumneme Amaefule
excela01@gmail.com

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. The research used an artificial neural network (ANN) to examine optimum extraction conditions and phytochemical contents of Luffa cylindrica seed oil. The oil yield was predicted using an artificial neural network. The performance of the ANN and response surface methodology models was compared. The optimum extraction yielded 7.567% oil yield, 185.676 mg/l phenol, and 45.087 mg/l terpineol at 75.57 °C extraction temperature, 5.77 h extraction time, and 10.68 g/mol n-hexane concentration, respectively. These data show that the oil output is poor but has a significant phenol and terpenoid content that may be employed in pharmaceutical sectors. The FT-IR analysis of Luffa cylindrica seed oil revealed a high level of unsaturated hydrocarbons and esters, making the oil appropriate for using in the paint industry and creating cosmetics.

Keywords: Artificial Neural Networks; Luffa cylindrica seed oil; alkyd resin; phytochemicals.

INTRODUCTION

Various plants have been used to produce oil. Although many different portions of plants may provide oil in commercial practice, oil is typically collected from seeds (endosperm) of plants that grow all over the globe. The properties of oils from various sources are determined mainly by their composition; no oil from a single source may be used for all applications [1]. The world is becoming more environmentally aware with the rising substitution of synthetic items with organically produced ones. Consequently, there is a rise in demand for seed oils as raw materials in the chemical industry. Some of these oils are ingested directly or indirectly as dietary ingredients or as components of many industrial items (e.g. soaps, perfumes, personal care and skin products, candles, and cosmetic products). Seed oils are also employed in biodiesel manufacture. Several oils, including moringa oil, sunflower oil, rapeseed oil, palm oil, soya bean oil, corn oil, baobab oil, and pumpkin oil [2], are expensive. Thus, there is a need for new low-cost oil seed crops for the production of inexpensive oils suitable for food, pharmaceutical, and Luffa cylindrica seed oil is one product that may be used to provide a good outcome in terms of cost, renewability, biodegradability, and non-edibility. With the current industrial attention to its renewability and global friendliness, luffa oil derivatives may find larger markets globally, increasing the quantity of study focused on harnessing its seed oils for diverse purposes. Regarding availability and renewability, Luffa cylindrica seed oil has been discovered to be a sustainable resource for biodiesel and alkyd resin production. Luffa cylin-

drica is a rapidly growing annual vine that spreads widely and matures in four months. The luffa plant is a cucurbit that includes gourds, pumpkins, and cucumbers and is part of the Cucurbitaceae family. Various names, including smooth loofah, loofah, loofah sponge, sponge gourd, vegetable sponge, dishrag gourd, and Chinese okra, know the Luffa. The luffa species are luffa cylindrica and luffa aegyptiaca [3]. In Nigeria, it is known as 'soso' in Hausa, 'kankan' in Yoruba, and 'asisa' in Ibo [4]. Most oil extraction processes are expensive owing to the inability to control specific intrinsic characteristics. Many studies have been conducted to discover alternate methods of manufacturing oil for process industries and the food business. It has been found that practically all seeds contain oil, which opens the door for other researchers to look for other applications for additional oil-producing chemicals prevalent in people's daily lives [5].

There are various methods for extracting oil from oilseeds. However, solvent extraction has been reported to be the most efficient [6], implying the need for process industries to optimise current extraction methods, thereby improving production profitability and ensuring a sufficient oil supply. Bioactive molecules in vegetables, fruits, cereal grains, and plant-based drinks such as tea and wine are known as phytochemicals. Because of their antioxidant and free radical scavenging properties, phytochemical ingestion is linked to a lower risk of various chronic illnesses [7]. Recent studies have also shown that they may have a role in better endothelial function and higher vascular blood flow [8]. About 10,000 phytochemicals have been identified, and many remain unknown [7]. Based on their chemical structure, phytochemicals can be broken into groups [9], as shown below in Figure 1.

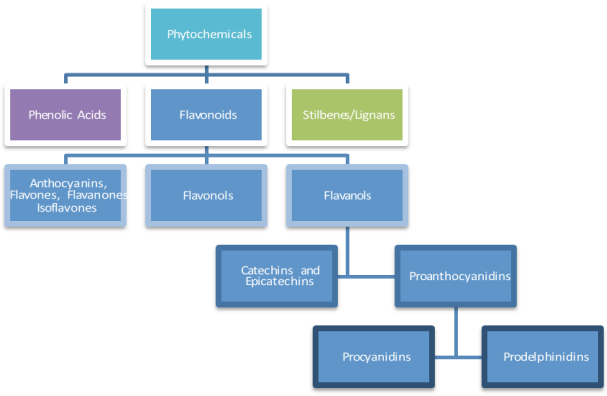


Figure 1 – Types of phytochemicals [10]

Response Surface Methodology (RSM) and Artificial Neural Networks (ANN) are mathematical and statistical approaches that may help assess observational evidence, determine the best scenario, and anticipate outcomes.

Depending on the degree of non-linearity and the initial assumption, most classic optimisation strategies based on gradient methods have the potential to get imprisoned at local optima. As a result, it does not assure global optimal and has restricted use. Non-traditional optimisation and search techniques and approaches based on natural phenomena such as neural networks and evolutionary computing (simulated annealing, genetic algorithm, and differential evolution) have been created [11]. An artificial neural network (ANN) is a simplified representation of a biological network's structure [12]. An artificial neuron is the core processing element of ANN (or simply a neuron). A biological neuron gets information from various sources, mixes it, applies a non-linear operation, and finally outputs the final result [13]. The primary benefit of ANN is that it does not need any mathematical model since it learns from examples and detects patterns in a sequence of input and output data without making any assumptions about their nature or interrelationships [12]. ANN is an excellent substitute for traditional empirical modelling based on polynomial and linear regressions [14]. More information is needed on the phytochemical composition of Luffa cylindrica seeds oil. As a result, this research aims to use an Artificial Neural Network to predict the phytochemical features of Luffa cylindrical seed oil.

Statement of the problem

Alternative materials are more required than ever in today's world for manufacturing lubricating oil, paints, varnishes, medicines, transformer oils, cosmetics, etc. Conventional fuels, such as coal, natural gas, and fossil fuel, are rapidly depleting; nonetheless, the world's reliance on these fuels is increasing. These minerals are byproducts of petroleum, which is non-renewable, non-biodegradable, and pollutes the environment; also, its over-dependence has resulted in shortages and the production of inferior goods. The usage of ANN was motivated by the requirement for an efficient model since RSM may not be able to correctly evaluate a big data set necessary to achieve accurate and optimal results.

ANN was used in this study to forecast the oil extraction process and to characterise the phytochemical properties of this plant's seed oil.

The precise goals of this research are as follows:

1. To extract, characterise, and evaluate the phytochemical characteristics of Luffa cylindrica seed oil.

2. To examine the influence of processing parameters on the extraction of Luffa seed oil and its phytochemical characteristics.

3. ANN was used to predict the phytochemical characteristics of Luffa cylindrica seed oil.

This research aims to reduce our reliance on imported oil by producing oil locally from Luffa seed, which can be used as raw materials in industrial applications, and to develop a new route from potential oil-producing roots. Over the years, researchers have struggled to create a model that can effectively anticipate the behaviour of the phytochemical characteristics of Luffa cylindrica seed oil; such models may drastically decrease time and operating costs in many technical areas. As a result, a requirement is to model Luffa seed oil extracts using Artificial Neural Network (ANN).

This research aims to extract Luffa cylindrica seed oil, analyse its phytochemical characteristics, investigate and optimise process factors, and forecast the phytochemical characteristics of Luffa seed oil using an Artificial Neural Network.

MATERIALS AND METHOD

Sample Collection. The Luffa samples were acquired from the National Root Crops Research Institute Umudike, Abia State, South-East of Nigeria and surrounding. The pieces were sorted, and the Luffa seed was extracted from the gourd by hand. The samples were maintained in an oven for a few hours to attain an equilibrium temperature with the environment before utilisation. Both ripened and dried fruit of this tree were collected in massive amounts. The seeds will be winnowed, and husks and dirt will be removed, following which it will be sun-dried for easy removal of the shell and will also be oven dried at 60c to constant weight before grinding to enhance the surface area for oil extraction.

The *materials used* for the experiment include the following: Oven, Grinder, Soxhlet Extractor, Reflux Condenser, Heating Mantle, and Round bottom flask.

Experimental design. The experiment was designed using Design Expert version 6.0.8, where a Box-Behnken experimental design was employed to optimise oil extraction from Luffa cylindrica. The experiment was designed on three levels, three factors that will generate 17 experimental runs. The three independent factors are extraction time, extraction temperature and solvent ratio.

Extraction of oil from Luffa Cylindrica using solvent extraction method. The extraction of oil was carried out in the laboratory of the Department of Chemical Engineering, the Michael Okpara University of Agriculture Umudike, Abia State, Nigeria, using the technique given by [15]. The extraction was carried out using a soxhlet apparatus of 250 cm^3 capacity using n-hexane of analytical quality as the solvent. The extraction was done by utilising a prepared sample of 40 g of luffa ground seed; the powdered oil seed was put into the thimble, and the thimble was placed in the soxhlet apparatus (Figure 2).

Figure 2 – Experimental apparatus for oil extraction

A round bottom flask with a known solvent volume (n-hexane) was placed on a heating mantle, delivering heat at a temperature just below the solvent's boiling. The soxhlet apparatus was put atop the flask, and intake and outflow water was linked to the condenser. Time of 4–6 hours, and extraction temperature ranges from 60 to 80 °C. The experimental runs were carried out according to the experimental runs produced by Design Expert.

The solvent was collected after every experimental run by a distillation procedure, and the natural oil produced was weighed. The experiment was repeated for additional settings, and the % yield was determined.

Determination of oil yield. The powdered seed will be weighed and put into a thimble. Soxhlet will be extracted for various time intervals based on the needed time interval for each experiment that will run between 4–6 hours using n-hexane as the solvent. The hexane extract will be filtered and evaporated under vacuum to create a thick mass of oil; the oil will be placed into a beaker of known weight and stored in a Griffin temperature adjustable oven at 60–70 °C to evaporate the excess solvent. The Luffa seed oil thus obtained shall be maintained in an air-tight container with no air gap and labelled appropriately. The percentage oil yield was measured as the ratio of the weight of oil recovered to the importance of the loofah seed sample before extraction. Oil yield was mathematically calculated using the formula employed by [16, 17]:

$$Oil\ Yield, \% = \frac{Weigt\ of\ \ Extracted\ Oil}{Weigt\ of\ \ the\ Seed} \times 100 \quad (1)$$

Screening of phytochemicals. Phenol Concentration Determination: The total phenol concentration measurement was adapted using the Folin Ciocalteu technique [18]. About 0.1 g of the oil extract was weighed into a test tube, and 1 ml of methanol was injected and brought into a water bath and shaker, where it was allowed to shake for 30 minutes at 40 °C.

The sample was withdrawn, 1 ml of Folin Ciocalteu was inserted, and 2 ml of 20% Na_2CO_3 was introduced. The combination was allowed to rest for 10 minutes before being spun in a centrifuge for 20 minutes at 400 vpm. The absorbance was obtained using a UV spectrophotometer at 625 nm. The standard curve was created by generating different levels of gallic acid starting at 10 mg/l.

Ann model development. Artificial neural network (ANN) architecture will be constructed in MATLAB 8.4 (R2015b) software environment where the training, validation and testing of the ANN model will be carried out. A three-layer ANN using a tangent sigmoid function (tensing) at the hidden layer, a linear transfer function at the output layer and the Levenberg-Marquardt backpropagation method with 1000 iterations. The input layer correlates with the three experimental parameters: temperature (°C), solvent ratio and time (minutes). The output layer will be the oil yield, terpineol concentration and phenol concentration (Figure 3).

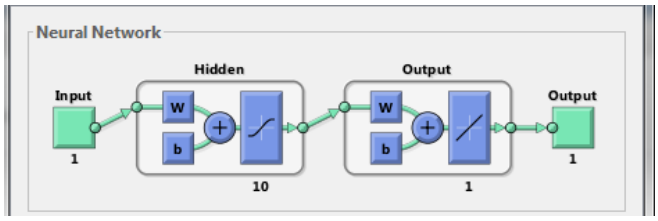


Figure 3 – Proposed ANN structure

All the data from oil extraction from Luffa cylindrica seed oil will be randomly separated into three groups (training, validation and testing) with a ratio of 70, 15 and 15%, respectively. In this investigation, ten neurons will be employed as a default test to establish the optimal method for the prediction. 1–15 neurons in the hidden layer and one neuron in the output layer will be applied, and data will be collected from multiple factors simultaneously.

RESULTS AND DISCUSSION

Oil yield analysis. The backpropagation method was determined after comparing eleven algorithms. For all Back Propagation methods, a three-layer ANN with a tangent sigmoid transfer function (tensing) at the hidden layer and a linear transfer function (purelin) at the output layer was employed. At the same time, ten neurons were utilised in the hidden layer for all BP strategies.

The benchmark comparison research demonstrated that the LMA could give reduced MSE compared to other BP algorithms. As indicated in Table 1, the minimum MSE was achieved at approximately 4.66180 x 10^{-7} using the trainlm function. However, trainrp and conjugate gradient algorithms such as traincgf, traincgp and traincgb showed more significant errors than the LMA, with the biggest mistake being traingdx with an error of 0.4217.

The loss in the optimality of the estimates/results provided by various BP training methods may be ascribed to the experimental

data's combinatorial character and non-linear structure. As a result, the different training methods used in the benchmark comparison confirmed the issue's complexity analysis.

Table 1 – Comparison of 11 backpropagation (BP) algorithms with ten neurons in the hidden layer for oil yield

Backpropagation Algorithms	Function	MSE	R^2
Levenberg–Marquardt backpropagation	*Trainlm*	4.66180 x10^{-7}	0.999999
Scaled conjugate gradient backpropagation	*Trainscg*	2.05657 x10^{-6}	0.999260
Resilient backpropagation (Rprop)	*Trainrp*	0.1692	0.90265
Fletcher–Reeves conjugate gradient backpropagation	*Traincgf*	0.0789	0.95038
Polak–Ribi´ere conjugate gradient backpropagation	*Traincgp*	0.1048	0.60435
Bayesian Regularization backpropagation	*Trainbr*	0.0542	0.7685
BFGS Quasi-Newton backpropagation	*Trainbfg*	0.0244	0.99786
One step secant backpropagation	*Trainoss*	0.0804	0.82931
Batch gradient descent	*Traingd*	0.1024	0.3752
Vairable learning rate backpropagation	*traingdx*	0.4217	0.43809
Batch gradient descent with momentum	*traingdm*	0.0796	0.93599

The exemplary architecture of the ANN model and its parameter modification was established based on the most negligible value of the MSE of the training and prediction set. In the optimisation of the network, two neurons were employed in the hidden layer as an initial estimate. With an increase in the number of neurons, the network provided numerous local minimum values, and distinct MSE values were acquired for the training set. The criteria for selecting the ideal ANN structure are the MSE of the train data and the correlation coefficient (R^2). Table 2 indicates the association between the number of neurons, R^2 and MSE for provided ANN.

Table 2 demonstrates the dependency of the MSE and R^2 on the number of neurons. The data indicated that the MSE lowers when the number of neurons grows with the MSE of 1.03080×10^{-3} and 2.50496×10^{-6} at neurons 2 and 3 correspondingly.

Table 2 – Comparison of 15 neurons in the hidden layer for oil yield using ANN model with Levenberg–Marquardt backpropagation algorithm

Neuron	MSE	R^2
2	1.03080 x 10^{-3}	0.996386
3	2.50496 x 10^{-6}	0.999996
4	3.15407 x 10^{-7}	0.999999
5	5.85051 x 10^{-11}	0.999999
6	4.17916 x 10^{-16}	0.999999
7	1.02388 x 10^{-19}	0.999999
8	2.72892 x 10^{-8}	0.999999
9	5.02974 x 10^{-8}	0.999999
10	5.43892 x 10^{-6}	0.999999
11	4.54943 x 10^{-8}	0.999999
12	2.79719 x 10^{-7}	0.999999
13	1.37048 x 10^{-11}	0.999999
14	1.01675 x 10^{-10}	0.999999
15	1.43506 x 10^{-12}	0.999999

The value falls, yielding the lowest MSE and R^2 value of 1.02388×10^{-19} and 0.999999 correspondingly at neuron 7. With hidden neuron 8, the MSE rose dramatically to 2.72892×10^{-8}. Hence, the neural network comprising seven hidden neurons (MSE 1.02388×10^{-19}) was selected as the best instance. The training was ended after 15 iterations (TRAINLM) for the LMA because the discrepancies between training error and validation error began to rise. Figure 4 displays the MSE vs the number of epochs for optimum ANN models.

Phenol analysis. The best-suited Back propagation algorithm was selected by comparing eleven backpropagation algorithms. For all Back Propagation algorithms, a three-layer ANN with a tangent sigmoid transfer function (tansig) at the hidden layer and a linear transfer function (purelin) at the output layer was used. In contrast, all BP algorithms used ten neurons in the hidden layer.

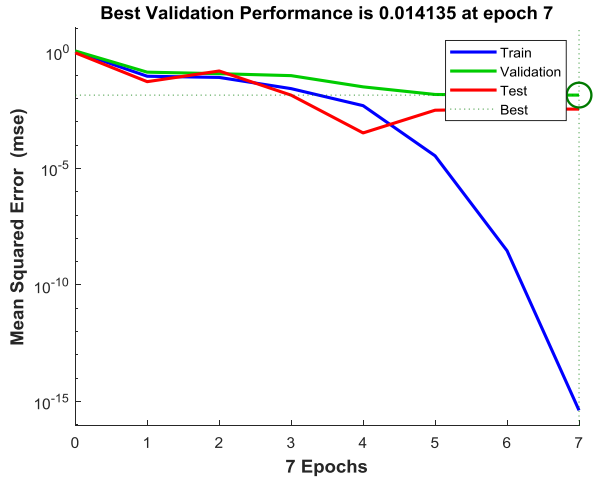


Figure 4 – Training, validation and testing mean squared errors using Levenberg-Marquardt algorithm for oil yield

The comparison analysis indicated that the LMA could reduce MSE compared to other BP algorithms. As shown in Table 3, the least MSE was found as 2.56353×10^{-9} for trainlm function. However, trainrp and conjugate gradient algorithms such as traincgf, traincgp and traincgb exhibited higher inaccuracy than the LMA.

Table 3 – Comparison of 11 backpropagation (BP) algorithms with ten neurons in the hidden layer for phenol

Backpropagation Algorithms	Function	MSE	R^2
Levenberg–Marquardt backpropagation	*Trainlm*	2.56353 x10^{-9}	0.999999
Scaled conjugate gradient backpropagation	*Trainscg*	2.04897 x10^{-1}	0.999966
Resilient backpropagation (Rprop)	*Trainrp*	933.0959	0.90666
Fletcher–Reeves conjugate gradient backpropagation	*Traincgf*	404.8389	0.9947
Polak–Ribi´ere conjugate gradient backpropagation	*Traincgp*	517.2193	0.88381
Bayesian Regularization backpropagation	*Trainbr*	2314.8	0.24899
BFGS Quasi-Newton backpropagation	*Trainbfg*	3855.8	0.3115
One step secant backpropagation	*Trainoss*	831.5908	0.88366
Batch gradient descent	*Traingd*	46575	0.065591
Vairable learning rate backpropagation	*traingdx*	2297.3	0.56472
Batch gradient descent with momentum	*traingdm*	11918	0.76078

The loss of the optimality of the estimates/results provided by various BP training methods may be ascribed to the experimental data's combinatorial character and non-linear structure. Hence, the complexity analysis of the issue was corroborated by the outcomes of the different training methods employed in the benchmark comparison.

The optimal architecture of the ANN model and its parameter modification was established based on the most negligible value of the MSE of the training and prediction set. In the optimisation of the network, two neurons were employed in the hidden layer as an initial estimate. With an increase in the number of neurons, the network provided numerous local minimum values, and distinct MSE values were acquired for the training set. The criteria for selecting the ideal ANN structure are the MSE of the train data and the correlation coefficient R^2.

The result in Table 4 demonstrates the association between the number of neurons, R^2 and MSE for provided ANN.

Table 4 – Comparison of 15 neurons in the hidden layer for phenol using ANN model with Levenberg-Marquardt backpropagation algorithm

Neuron	MSE	R^2
2	0.514682	0.999835
3	169.61173	0.959863
4	22.95281	0.996263
5	0.844487	0.999740
6	5.94709 x 10^{-6}	0.999999
7	1.41027 x 10^{-2}	0.999998
8	0.115657	0.999983
9	1.53708 x 10^{-2}	0.999998
10	1.34121 x 10^{-3}	0.999999
11	3.74065 x 10^{-17}	0.999999
12	1.27561 x 10^{-5}	0.999999
13	1.49294 x 10^{-3}	0.999999
14	1.54694 x 10^{-4}	0.999999
15	2.62219 x 10^{-6}	0.999999

The result in Table 4 demonstrates the relationship between the MSE and R^2 on the number of neurons. The observation indicated that the MSE value lowers as the number of neurons rises.

The MSE value of 0.514682, 169.61173 and 22.95281 was found at neuron 2, 3 and 4, accordingly revealing an unfitted correlation of the experimental results. The MSE value reduced dramatically at neuron 6 to 5.94709×10^{-6} while the lowest MSE value and best correlation coefficient (R^2) of 3.74065×10^{-17} and 0.999999 was found when the number of the hidden neuron was raised to 11. Therefore, the neural network comprising 11 hidden neurons was the best instance. The training was ended after 15 iterations (TRAINLM) for the LMA because the discrepancies between training error and validation error began to rise.

Figure 5 displays the MSE vs the number of epochs for optimum ANN models.

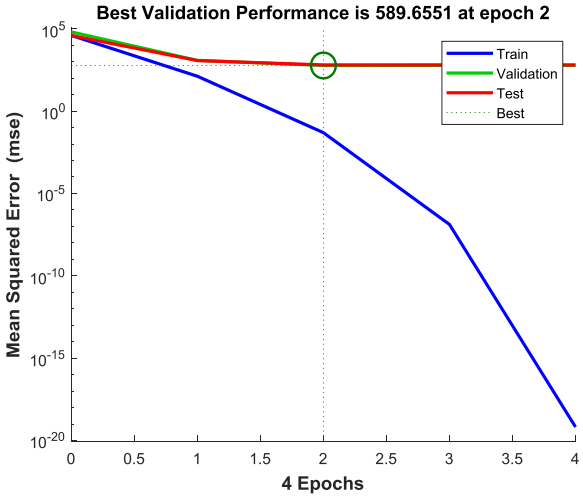


Figure 5 – Training, validation, and test mean squared errors using the Levenberg-Marquardt algorithm for phenol

Terpenol analysis. The backpropagation algorithm was selected by comparing eleven algorithms. For all Back Propagation algorithms, a three-layer ANN with a tangent sigmoid transfer function (tansig) at the hidden layer and a linear transfer function (purelin) at the output layer was used. In contrast, all BP algorithms used ten neurons in the hidden layer.

The benchmark comparison study showed that the LMA could provide smaller MSE than other BP algorithms. As shown in Table 5, the smallest MSE was obtained at about 4.97667×10^{-6} for trainlm function. However, trainrp and conjugate gradient algorithms such as traincgf, traincgp and traincgb produced more significant errors than the LMA.

Table 5 – Comparison of 11 backpropagation (BP) algorithms with ten neurons in the hidden layer for terpenol

Backpropagation Algorithms	Function	MSE	R^2
Levenberg–Marquardt backpropagation	*Trainlm*	4.97667 x10^{-6}	0.999999
Scaled conjugate gradient backpropagation	*Trainscg*	0.143568	0.999991
Resilient backpropagation (Rprop)	*Trainrp*	8405.1	0.96085
Fletcher–Reeves conjugate gradient backpropagation	*Traincgf*	4093.2	0.99678
Polak–Ribi´ere conjugate gradient backpropagation	*Traincgp*	10718	0.99996
Bayesian Regularization backpropagation	*Trainbr*	69787	0
BFGS quasi-Newton backpropagation	*Trainbfg*	151130	0.26056
One step secant backpropagation	*Trainoss*	50466	0.98762
Batch gradient descent	*Traingd*	768840	0.5117
Vairable learning rate backpropagation	*Traingdx*	264140	0.57543
Batch gradient descent with momentum	*Traingdm*	377800	0.21375

The loss of the optimality of the estimates/results produced by some BP training algorithms can be attributed to the experimental data's combinatorial nature and non-linear structure. Hence, the complexity analysis of the problem was validated by the results of the various training algorithms used in the benchmark comparison.

Table 6 depicts the dependence of the MSE and R^2 on the number of neurons. The result showed that the MSE decreases as the number of hidden neurons increases.

Table 6 – Comparison of 15 neurons in the hidden layer for oil yield using ANN model with Levenberg–Marquardt backpropagation algorithm

Neuron	MSE	R^2
2	8.74906	0.999942
3	18.22798	0.999815
4	6.69517×10^{-2}	0.999999
5	2.99420	0.999979
6	2.08963×10^{-2}	0.999999
7	7.55075×10^{-2}	0.999999
8	8.67223×10^{-3}	0.999999
9	3.06928×10^{-8}	0.999999
10	1.46451×10^{-3}	0.999999
11	2.13275×10^{-2}	0.999999
12	7.51982×10^{-26}	0.999999
13	2.16813	0.999986
14	8.70552×10^{-5}	0.999999
15	2.39935×10^{-3}	0.999999

The MSE of 8.74906 and 18.22798 was obtained at neurons 2 and 3, respectively. The value reduces significantly to 6.69517×10^{-2} at four neurons. The decrease was continuous to neuron 12, giving the lowest MSE and R^2 values of 7.51982×10^{-26} and 0.999999, respectively. Hence, the neural network containing 12 hidden neurons was the best case. The training was stopped after 15 iterations (TRAINLM) for the LMA because the differences between training error and validation error started to increase. Figure 6 shows the MSE versus the number of epochs for optimal ANN models.

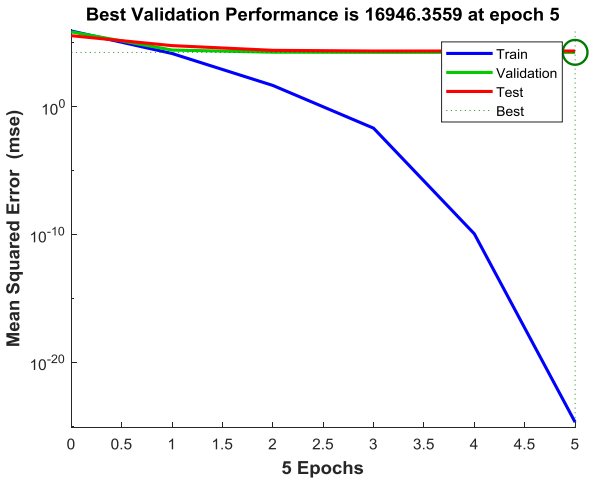


Figure 6 – Training, validation, and test mean squared errors using the Levenberg-Marquardt algorithm for terpanol

The comparison analysis (Table 7) of the response surface methodology and artificial neural network showed that the correlation coefficient result of the oil yield for RSM was obtained as 0.8395 while ANN has 0.99999.

Table 7 – Comparison of RSM and ANN value

	RSM	ANN	
	R^2	MSE	R^2
Oil Yield	0.8395	1.02388×10^{-19}	0.999999
Phenol	0.9942	3.74065×10^{-17}	0.999999
Terpanoid	0.9868	7.51982×10^{-26}	0.999999

The RSM correlation coefficient for phenol and terpanoid were obtained as 0.9942 and 0.9868, respectively, while the ANN correlation coefficient for phenol and terpanoid was 0.99999 for both. The result emphasised that the ANN model result has a better correlation than the RSM.

The FT-IR result of the oil yield from Luffa cylindrical, as shown in Figure 7, indicated a pointed peak of 3008.0, indicating the alkene group, which is an unsaturated hydrocarbon.

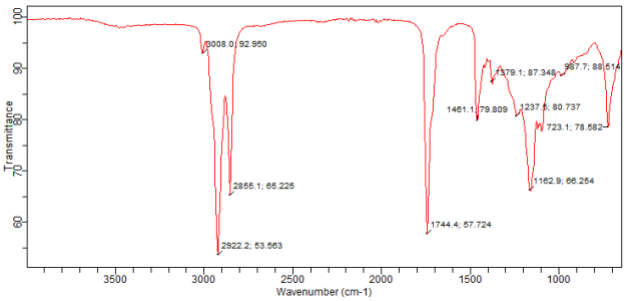


Figure 7 – FT-IR result of the oil yield

Two sharp pointed peaks of 2922.2 and 2855.1 told the alkane group. The figure also showed another sharply tapered area with a value of 1744, indicating the presence of esters (6-membered lactone) with the structure C=O; hence the oil has a high saponification value and could be recommended for soap production. The shorter, more minor point was observed with a value of 1461.1, indicating an alkane of the methylene group. In contrast, a medium sharp point was honoured with a value of 1379, showing an alkane of the gem dimethyl group. The point with value 1237.5 indicated an alkyl aryl ether with structure C–O–C, while 987.7 and 723.1 points indicated alkene compounds.

CONCLUSIONS

A three-layer ANN with a tangent sigmoid transfer function (tansig) at the hidden layer and a linear transfer function (purelin) at the output layer was suggested to estimate the oil yield, phenol and terpenol content of luffa cylindrica seed oil.

The benchmark comparisons conducted with ten hidden neurons resulted that Levenberg–Marquardt algorithm was the best algorithm among the eleven backpropagation algorithms used due to the nearness of its R^2 to 1 and the Mean Root Square to zero compared to the other 11 BP algorithms for the oil yield, phenol and terpenol content. The comparative study of the response surface methodology and artificial neural network indicated that the correlation coefficient result of the oil yield for RSM was achieved as 0.8395 while ANN has 0.99999. The RSM correlation coefficient for phenol and terpanoid were found as 0.9942 and 0.9868, correspondingly, while the ANN correlation coefficient for phenol and terpanoid was 0.99999 for both. The study underlined that the ANN model result correlates more significantly than the RSM. The FT-IR result of the Luffa cylindrical seed oil indicated a high degree of unsaturated hydrocarbon and esters. This makes the oil ideal to be utilised mainly in paint industries as a drying agent, cosmetics manufacturing, and soap production and may also be edible for animal feed.

The phytochemical properties of an oil are essential in determining the medicinal effects of the oil as well as its uses in various fields; hence it is recommended that further studies should be carried out on predicting the phytochemical properties of the luffa cylindrical seed oil using another black box model such as Adaptive Neuro-Fuzzy Inference System (ANFIS).

However, a simulation based on the ANN model may contribute to a better understanding of the dynamic behaviour of processes.

REFERENCES

1. Bello, M. O., Akindele, T. L., Adeoye, D. O., & Oladimeji, A. O. (2011). Physicochemical Properties and Fatty Acids Profile of Seed Oil of Telfairiaoccidentalis Hook, F. *International Journal of Basic & Applied Sciences, 11*(6), 9–14.
2. Dorado, M. P., Ballesteros, E., López, F. J., & Mittelbach, M. (2003). Optimization of Alkali-Catalyzed Transesterification of Brassica Carinata Oil for Biodiesel Production. *Energy & Fuels, 18*(1), 77–83. doi: 10.1021/ef0340110
3. Atlas of Florida Plants. Institute for Semantic Botany. (n. d.). *Luffa aegyptica*. Retrieved from https://florida.plantatlas.usf.edu/plant.aspx?id=178
4. CABI Compendium. (2022). *Luffa aegyptiaca (loofah)*. doi: 10.1079/cabicompendium.31693
5. Yetilmezsoy, K., & Demirel, S. (2008). Artificial neural network (ANN) approach for modeling of Pb(II) adsorption from aqueous solution by Antep pistachio (Pistacia Vera L.) shells. *Journal of Hazardous Materials, 153*(3), 1288–1300. doi: 10.1016/j.jhazmat.2007.09.092
6. Topallar, H., & Gecgel, U. (2000). Kinetics and Thermodynamics of Oil Extraction from Sunflower Seeds in the Presence of Aqueous Acidic Hexane Solutions. *Turkish Journal of Chemical, 24*(3), 247–253.
7. Zhang, Y.-J., Gan, R.-Y., Li, S., Zhou, Y., Li, A.-N., Xu, D.-P., & Li, H.-B. (2015). Antioxidant Phytochemicals for the Prevention and Treatment of Chronic Diseases. *Molecules, 20*(12), 21138–21156. doi: 10.3390/molecules201219753
8. Du, G., Sun, L., Zhao, R., Du, L., Song, J., Zhang, L., He, G., Zhang, Y., & Zhang, J. (2016). Polyphenols: Potential source of drugs for the treatment of ischaemic heart disease. *Pharmacology & Therapeutics, 162*, 23–34. doi: 10.1016/j.pharmthera.2016.04.008
9. Arts, I. C., & Hollman, P. C. (2005). Polyphenols and disease risk in epidemiologic studies. *The American Journal of Clinical Nutrition, 81*(1), 317S-325S. doi: 10.1093/ajcn/81.1.317s
10. Thiede, A., & Zidenberg-Cherr, S. (2016, June). *Nutrition and Health Info Sheet: Phytochemicals*. Retrieved from

https://nutrition.ucdavis.edu/sites/g/files/dgvnsk426/files/content/infosheets/factsheets/fact-pro-phytochemical.pdf

11. Baby, B. V. (2004). *Process Plant Simulation*. Oxford: Oxford University Press.
12. Mandal, S., Sivaprasad, P. V., Venugopal, S., & Murthy, K. P. N. (2009). Artificial neural network modeling to evaluate and predict the deformation behavior of stainless steel type AISI 304L during hot torsion. *Applied Soft Computing, 9*(1), 237–244. doi: 10.1016/j.asoc.2008.03.016
13. Baş, D., Dudak, F. C., & Boyacı, İ. H. (2007). Modeling and optimization IV: Investigation of reaction kinetics and kinetic constants using a program in which artificial neural network (ANN) was integrated. *Journal of Food Engineering, 79*(4), 1152–1158. doi: 10.1016/j.jfoodeng.2006.04.004
14. Kose, E. (2008). Modelling of colour perception of different age groups using artificial neural networks. *Expert Systems with Applications, 34*(3), 2129–2139. doi: 10.1016/j.eswa.2007.02.036
15. Afolabi, T., Onifade, K., Akindipe, V., & Odetoye, T. (2015). Optimization of Solvent Extraction of Parinari polyandra Benth Seed Oil Using Response Surface Methodology. *British Journal of Applied Science & Technology, 5*(5), 436–446. doi: 10.9734/bjast/2015/10747
16. Olaniyan, Adesoji & Oje, K. (2011). Development of model equations for selecting optimum parameters for dry process of shea butter extraction. *Journal of Cereals and Oilseeds, 2*(4), 47–56.
17. Oniya, O. O., Oyelade, J. O., Ogunkunle, O., & Idowu, D. O. (2017). Optimization of Solvent Extraction of Oil from Sandbox Kernels (Hura Crepitans L.) by a Response Surface Method. *Energy and Policy Research, 4*(1), 36–43. doi: 10.1080/23815639.2017.1324332
18. Singleton, V. L., & Rossi, J. (1965). Colorimetry of Total Phenolics with Phosphomolybdic-Phosphotungstic Acid Reagents. American Journal of Enology and Viticulture, 16, 144–158.

Recover Data about Detected Defects of Underground Metal Elements of Constructions in Amazon Elasticsearch Service

Roman Mysiuk [1], **Volodymyr Yuzevych** [2]

[1] *Ivan Franko National University of Lviv*
1 Universytetska Street, Lviv, 79000, Ukraine

[2] *Karpenko Physico-mechanical Institute of the NAS of Ukraine*
5 Naukova Street, Lviv, 79060, Ukraine

DOI: 10.22178/pos.89-9

JEL Classification: L95

Received 25.12.2022
Accepted 27.01.2023
Published online 31.01.2023

Corresponding Author:
Roman Mysiuk
mysyukr1@ukr.net

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. This paper examines data manipulation in terms of data recovery using cloud computing and search engine. Accidental deletion or problems with the remote service cause information loss. This case has unpredictable consequences, as data must be re-collected. In some cases, this is not possible due to system features. The primary purpose of this work is to offer solutions for received data on detected defects of underground metal structural elements using modern information technologies.

The main factors that affect underground metal structural elements' durability are the soil environment's external action and constant maintenance-free use. Defects can usually occur in several places, so control must be carried out along the entire length of the underground network. To avoid the loss of essential data, approaches for recovery using Amazon Web Service and a developed web service based on the REST architecture are considered. The general algorithm of the system is proposed in work to collect and monitor data on defects of underground metal structural elements. The result of the study for the possibility of data recovery using automatic snapshots or backup data duplication for the developed system.

Keywords: recovering data; search; cloud computing; snapshots; corrosion; defects; underground metal elements of construction.

INTRODUCTION

Underground metal elements of constructions provide transportation and delivery of oil and gas products to different countries of Eastern and Central Europe, which is 2–3 times faster than in any other way. With constant operation in underground metal elements of constructions, there are various defects due to active mechanical stress and function in specific conditions of the soil environment. Severe defects usually cause accidents on such lines and lead to environmental and even man-made disasters. Based on the possible risks, all underground metal elements of constructions are carefully monitored and maintained in good working order so that no cracks can affect the functioning of the structure [1, 2]. To monitor such systems, a large amount of data needs to be processed because the length of underground metal elements of constructions is kilometres [3]. Big Data is actively developing in Ukraine and is used in various sectors of the economy due to the rapid scalability of such systems. The most popular way to transfer data is to use network data transfer protocols. Elasticsearch is a non-relational database (NoSQL) in which data is transmitted via network requests. It can be used as a portable microcomputer with the possibility of using additional modules to collect input information for the system. One of the most popular cloud environments is Amazon Web Service (AWS). This allows constant access to the database and data processing using cloud technology. The work aims to create a secure system that can analyse input information and show the possibility of data recovery in case of loss in such scenarios.

MATERIALS AND METHODS

Materials and Methods

There are various types of databases used for storing different varieties of data:

– A centralised database differs from others in that it is accessed through a computer network, which can give them access to a central processing unit (CPU) that supports the database. Such a means of using databases are commonly used in local networks.

– A distributed database is a database that consists of two or more files located on different sites or the same network, or completely different networks. Parts of the database are stored in several physical locations, and processing is distributed among many database nodes.

– NoSQL database, which provides a mechanism for storing and retrieving data, is different from the approach of relationship tables in relational databases. NoSQL databases are increasingly used in big data tasks and real-time web applications.

– A relational database is a collection of data elements organised as a set of formally described tables, from which data can be accessed or recollected in many ways without reorganising the database tables.

– A cloud database is a type of database that performs queries on a remote machine.

– In computing, a graph database uses various nodes, edges, and properties to represent and store information for semantic queries. This type is used to visualise complex structural connections better.

Cloud technologies and computing are becoming increasingly popular. This is because cloud environments have many useful features and security. Amazon Web Service is chosen for the developed system due to its user-friendly interface and easy integration.

This system uses a non-relational database because NoSQL databases are document, key-value, graph, or wide-column stores and are well suited for working with many JavaScript Object Notation (JSON) documents.

Elasticsearch (ES) is a search engine that uses the Lucene library. This allows you to create a distributed full-text search with the ability to use multiple units using the Hypertext Transfer Protocol (HTTP) web interface and schema-free JSON documents [4]. Elasticsearch provides a full Query Domain-Specific Language DSL (DSL) based on JSON to define queries. Elastic search queries can include many conditions simultaneously, and the size of such a query can be significant. Queries can be divided into geo, compound, range, term level, string, multi-match, full text, and match all [5].

In ES, all data is contained in separate indexes, and searches can join using a query with multiple fields at once [6]. Indexes can be divided into shards, and each guard can have any number of replicas. Routing and rebalancing operations are performed automatically when new documents are added. This database has a separate bulk Application Programming Interface (API) function for data ingestion, which allows multiple operations to index and deletes in a single API request. It can significantly increase the indexing speed. To execute bulk API, we need to have a preformed data file and run it from the command line using a simple curl command. There are some restrictions on file size and the number of entries. It has been tested that the file should not exceed about 50 MB or the number of records of 100,000 for the presented case [7].

Amazon Elasticsearch Service (Amazon ES) lets you store up to 3 PB of data in a single cluster, enabling you to run large log analytics workloads via a single Kibana interface. Using the AWS cloud environment allows us to have a global, highly accessible, secure domain to access ES [8]. Another advantage is the quick-to-search data [9].

Data recovery is one of the main issues [10]. There is a unique mechanism for recovering data lost or deleted, called snapshots. Snapshots are backups of the Amazon ES cluster indexes and status. The state includes cluster parameters, node information, index parameters, and shard distribution. Data unavailability may be due to index status. Possible positions include green, yellow, and red. The last two signal some problems; in this case, data recovery is also essential. Amazon Elasticsearch is ready to recover data [11]:

– Automated snapshots are for cluster recovery only. Amazon ES stores automated shots in a preconfigured bucket of AWS Simple Cloud Storage (S3) at no extra charge.

– Manual snapshots are used to restore a cluster or to move data from one cluster to another. This

requires manual shooting. These snapshots usually use your Amazon S3 bucket, and S3 payments apply accordingly.

Experimental procedures

This section describes the system's main configuration, data preparation, and design. The processes of setting up the cloud environment, filling it with data, and the structure of the web service are described.

System Configuration. A restful web service is created that works with ES and displays information about the status of underground metal elements of constructions in real time. This web service is developed using Java programming language and Spring framework [12].

Before starting with our approach, you should follow a few preliminary steps. The following tools are used in the development:

– Java Development Kit – a set of development tools and libraries containing documentation, standard libraries, and code compiler for Java classes. Today, the approach of building a client-server architecture using the Java programming language through cross-platform and object-oriented language is prevalent.

– Maven is an open-source programming tool for building our projects. There are a few phases of the lifecycle: validate, compile, test, package, verify, install, and deploy. Each of these phases helps to perform specific actions with the code. This application construction allows using ready-made functions to collect code into one assembly. Moreover, all additional libraries are downloaded from a remote repository, which replaces jar files.

To efficiently run multiple instances of Elasticsearch locally, you need to download the tar or zip archive from the official site and run the bat file in the bin folder.

To test ES in the cloud, follow these steps using the Amazon ES, AWS Command Line Interface (AWS CLI), or AWS Software Development Kit (AWS SDK):

1. Create an Amazon ES domain. To do this, you must select the appropriate general settings, such as deployment and instance types, and provide a name for the domain, etc. All other settings can be ignored for now. In my case, one of the smallest instance types was selected t3.small.elasticsearch. According to on-demand instance pricing for this type, vCPU, and Memory (GiB) are 2. Which is enough for initial testing [8].

2. Wait until the settings are activated. It typically takes 15–20 minutes to initialise.

3. Upload the data to the Amazon ES domain for indexing.

Data Preparation. For the current testing of this system, the generated test data using Bash were used randomly. The Restful service mocking feature allows us to simulate accurate data using generated test data. In the future, there is a plan to integrate actual test data from some external devices.

Bash is a scripting language where any command can be grouped and executed in a single file. Functions can be created in any programming language, simplifying code reuse. The bash script is a temporary solution. Instead of fundamental values, random values of characters are generated using functions in Bash. The main steps are following in this script:

– Create variables for index names for devices and ES domains.

– Create a mapping of records in ES for each index using a loop [13]. The default mapping is created at the first record, but when you want to make a custom. This is filled in once and is editable. Mapping indicates in what format and type of data will be stored. The curl tool sends requests via the command line, which allows you to work with URL syntax. The following command can be executed:

```
curl -X PUT "$domain/$indexName" -H "Content-Type: application/json" -H "Accept: application/json" -d @$deviceIndexMapping
```

– Generate a temporary file with test data filled with random values using Bash. Figure 1 displays a model of test data. The JSON format, which is presented in a key-value format, was used to describe the data. This presentation is easy to read and acceptable for Elasticsearch search engines.

– Push data from file to ES using Bulk API:

```
curl -H 'Content-Type: application/x-ndjson' -XPOST $domain/_bulk --data-binary @"generated_data.json"
```

– Remove the temporary file.

Generated files should be divided and pushed in a loop due to the limitation of bulk API operations. For each index to have approximately the same number of records, the number of completed cycles must be multiplied by the number of records per push and divided by the number of indices. As a result, it allows the approximate number of iterations of loops to reach a certain number in each index. There is also a collection of information on various parameters, such as time and relativity to the device, allowing you to display it on web applications.

```
{
    "id": "'$randomId'",
    "device_name": "'$(($RANDOM % 1000 + 1))'",
    "date": "'date +\"%D\"'",
    "time": "'date +\"%T\"'",
    "external_factors": [
        {
            "soil_moisture": "'$(($RANDOM % 100 + 1))'",
            "temperature": "'$(($RANDOM % 100 + 1))'"
        }
    ],
    "potential_current": [
        {
            "value": "'$(($RANDOM % 1000 + 1))'"
        }
    ],
    "geographic_coordinate_system": [
        {
            "latitude": "'$(($RANDOM % 1000 + 1))'",
            "longitude": "'$(($RANDOM % 1000 + 1))'"
        }
    ]
}
```

Figure 1 – Example of test data filled with random values using Bash script

System design. The Internet is a universal way to access data anywhere in the world. The development of web services as a backend part of the browser has become very popular due to the increasing use of web browsers [14].

The structure of the proposed system is shown in Figure 2. The central part of the system is a web service. The most used architectural style REST is used for creation. This web service can easily obtain and display the desired data. The service is developed based on Spring Framework.

To avoid external data interception and make the system more closed, it is recommended to use the secure Hypertext Transfer Protocol Secure. With Transport Layer Security (TLS) or Secure Sockets Layer (SSL), data is encrypted with this approach. Therefore, you need to configure environment variables in the settings or the environment of the program or computer with which the web service works.

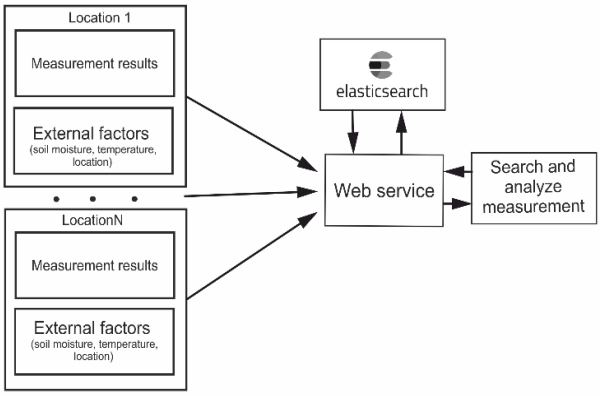


Figure 2 – The system for collecting and analysis for underground metal elements of constructions architecture

Although personnel data is not used in this system, we must take care of our product's security by reducing the system's vulnerability to external attacks. The approach of using Open Authorization (OAuth) for greater security is also popular, which is added to the existing web service too. With the help of generated tokens with a request, communication with the system can be sent.

Several endpoints are developed in web service for restoring data using some from the list of standard HTTPS methods such as GET, HEAD, POST, PUT, PATCH, DELETE, CONNECT, OPTIONS, and TRACE. For instance: GET method with request template:

{domain}/snapshots/{snapshot_id}, POST *{domain}/snapshots* with the following request body *"{"from":"from_snapshot_id", "to":"to_snapshot_id"}"* and DELETE *{domain}/snapshots/{snapshot_id}*.

This group of operations is based on the Reindex API in ES. This feature is an additional option for data recovery, although it can cause redundancy of duplicate data.

In addition, the system allows getting information on time, id, device, and all the information, in general, using the web service. The following endpoints have been created for getting information:

– *GET {domain}/measurement/devices.*

– *GET {domain}/measurement/devices/{device_id}.*

– *GET {domain}/measurement/{measurement_id}.*

– *GET {domain}/measurement/datatime?timeFrom={startTime}&timeTo={finishTime}*.

This system can be considered a cyber-physical system. A new method for assessing the degree of the information security risk of the system for the control of underground metal constructions is proposed. In addition, taking into account the index of the probability of a successful attack on the system, the index of the impact of the attack, the adjustment index, which provides feedback, and the quality criterion [15].

Web service works like an additional layer on the system. In this case, that helps us to communicate with data using a particular query. From on security perspective, that allows preventing different external attached to the system in further testing.

RESULTS AND DISCUSSION

Before starting the web service, the environment variables must be configured for setting OAuth token and using HTTPS, then:

1) Run Bash script to generate and push test data in Elasticsearch.

2) Check created indices in Figure 3. The created indexes are presented in the form of a table with the size of the existing data, the current state of the cluster, and other information. To view this information, the */_cat/indices* endpoint of Elasticsearch must be reached.

3) Run the project using the command line: *mvn clean install.*

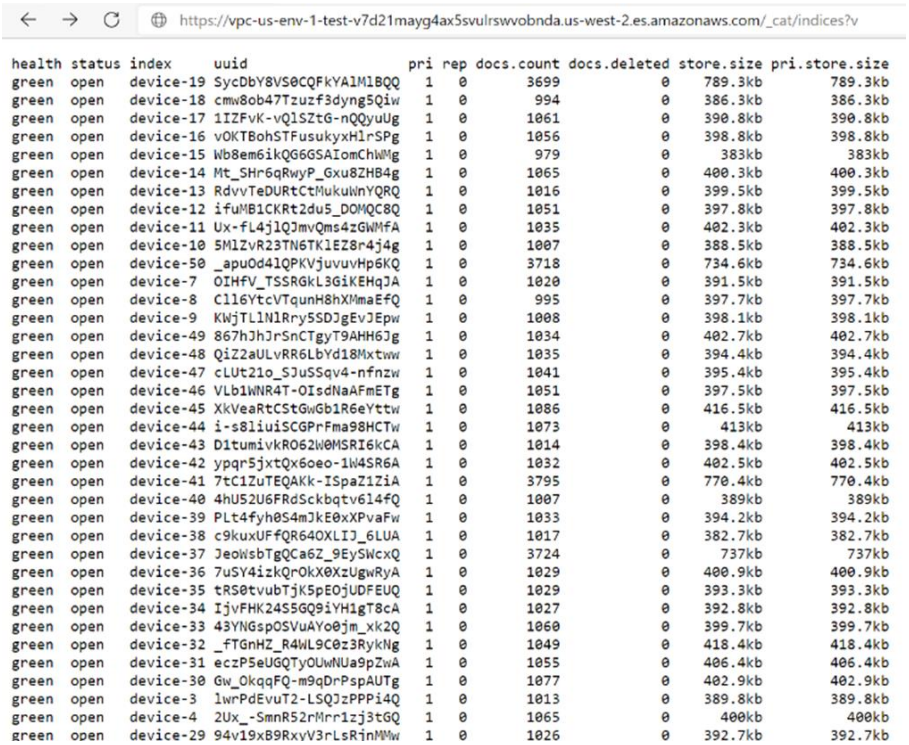


Figure 3 – List of created indices with generated data

Index duplication. The first way to prevent data loss is to create a duplicate index. This method should be considered one of the most possible. This does not provide complete security, but in case of problems with the current index allows you to switch to snapshot quickly. In Figure 4, the execution of the query for duplicating indexes with data is demonstrated. For web service testing purposes, the Postman desktop application is used. This tool allows querying web resources. It is beneficial when you need to make requests to create, update, and delete documents. A regular browser can be used to view GET requests, as shown in Figure 3.

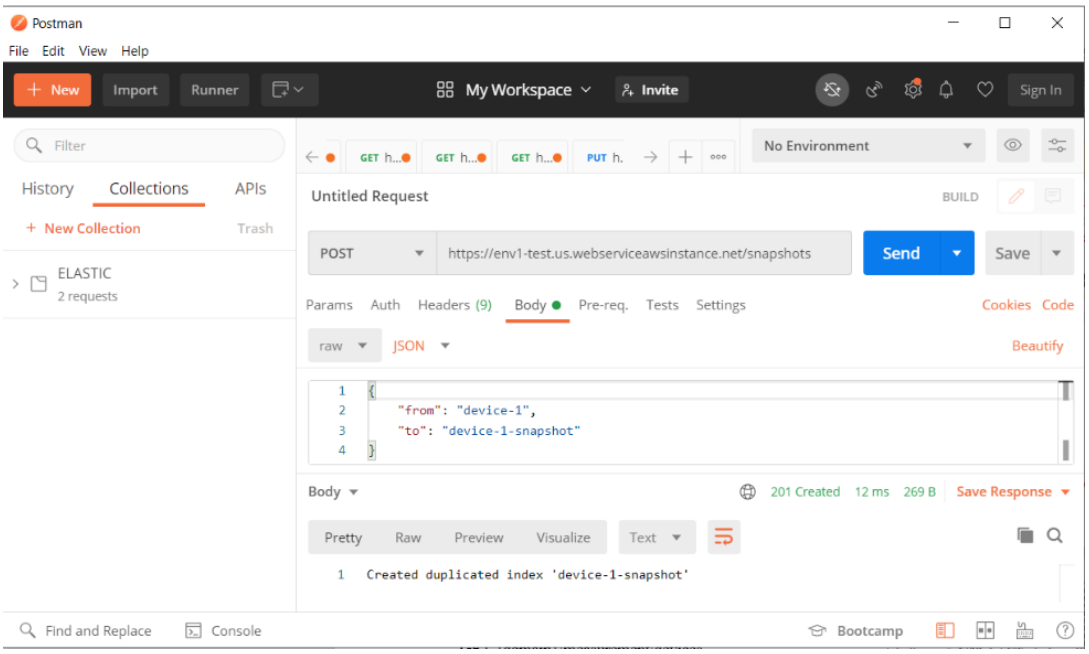


Figure 4 – Executing a query using a web service to create duplicate indexes on the Postman tool

After duplication, the existing Elasticsearch indexes can be checked. Figure 5 shows the duplicated device-1-snapshot index.

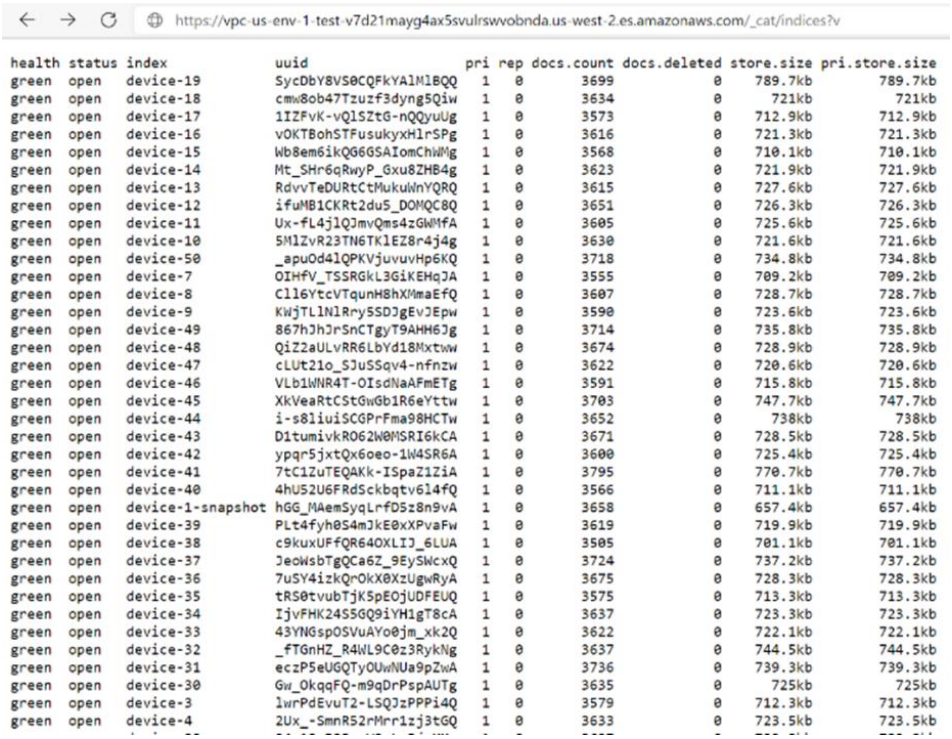


Figure 5 – Verification list of indices

In general, duplicating data is not the best way to avoid data loss, as an increase in records and memory accompanies it.

The number of indices is not a significant factor in productivity. An important parameter is the number of shards that must be selected correctly. The cluster should be optimised to avoid impact on performance. The best ratio of the number of bits and replicas can be chosen using performance testing [16]. Amazon CloudWatch can be used for monitoring the results of cluster metrics [8].

Automated and manual snapshots

The second way to recover data is to use automated and manual snapshots on Amazon ES if we do not have a duplicated data set.

Elasticsearch requires repository-s3 plugin to work with an S3 bucket. Therefore, the following operations on the command line must be performed:

– Installing repository-s3: *sudo bin/elasticsearch-plugin install repository-s3*

– Restarting Elasticsearch: *sudo systemctl restart elasticsearch.service*

The next step is to log in to the AWS account and create an identity-based user policy (IAM) with the necessary S3 permissions [8].

The next necessary step is to specify a bucket name to register the S3 repository using the following command:

curl --location --request PUT 'http://{domain}/_snapshot/backup_repository_s3' --header 'Content-Type: application/json' --data-raw '{"type": "s3", "settings": {"bucket": "elastic-slm"}}'

The last setting is defining our Snapshot lifecycle management (SLM) policy. This means that we will always be able to have a copy of the indexes available, which are generated and deleted at the specified time. In the JSON body, the following fields should be defined: schedule (when the snapshot must be taken into S3 bucket using Cron syntax), name (how to name the snapshot with the current date using date math), repository (where to store the snapshot), config (which indices to include in the snapshot), retention (define the expiration time and the minimum and maximum snapshot count) [17].

To apply these changes, the command should be performed:

*curl --location --request PUT 'http://{domain}/_slm/policy/backup_policy_daily_s3' --header 'Content-Type: application/json' --data-raw '{ "schedule": "0 01 2 * * ?", "name": "backup-device-{now/d}","repository":"backup_repository_s3","config":{ "indices":["*"]},"retention":{"expire_after":"1d", "min_count": 5, "max_count": 20 }}'*

The web interface for lifecycle management snapshots is shown in Figure 6.

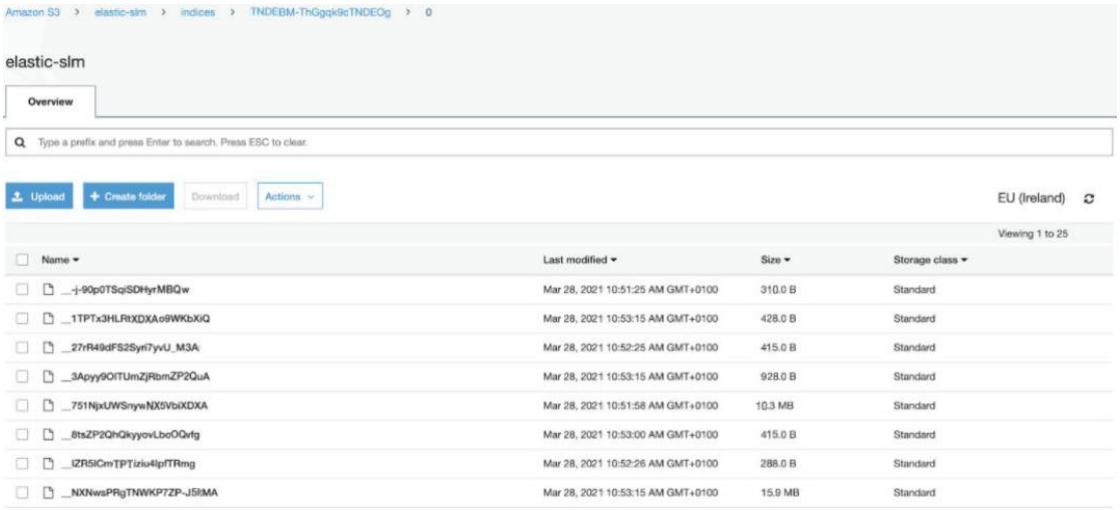


Figure 6 – Example of snapshot lifecycle management using the web interface on Amazon ES

The AWS command line interface can be used to verify the changed size of our bucket after all previous steps are performed:

aws s3 ls s3://elastic-slm --human-readable --recursive –summarize

In the same way, indices can be restored using a web interface on Amazon ES.

The restore command must be executed to restore the snapshot after the last step in the AWS command line:

curl -XPOST 'elasticsearch-domain-end-point/_snapshot/repository/snapshot/_restore'

According to Amazon documentation, most automated images are stored in cs-automated storage. If your domain encrypts data at rest, it is stored in the cs-automated-enc repository [11].

One index can be changed to another duplicate index with the same working indices. In ES, bulk index alias API functionality is created to create and remove multiple index aliases in a single API request. Alternatively, an alias can be used as a second name to refer to one or more existing indexes. However, several indexes may contain the same alias, but it is impossible to have the same name as the index. This HTTP request is as follows:

POST {ES domain}/_aliases {"actions":[{"remove":{"index" : "device-1", "alias" : "device-1-alias-1" } }, { "add" : { "index" : "device-1", "alias" : "device-1-alias-2" } }] }

CONCLUSIONS

Monitoring data on defects in underground metal structural elements is helpful for the timely prevention of hazards that often occur today during the transportation of various products and substances. For the smooth operation of the proposed system, you need to save the data and, in case of loss, quickly restore it. This article describes how to configure these tools for use. Methods of automatic recovery through snapshots in Amazon Web Service or through duplicate indexes in Elasticsearch are considered. Therefore, given the implemented system, we can make the following results:

– Checked the data recovery application from the non-relational database Elasticsearch and the created web service.

– Tested database completion based on a set of test data using Bash.

– Considered the system for possible detection of defects in underground metal elements of structures.

REFERENCES

1. Yuzevych, L., Skrynkovskyy, R., Yuzevych, V., Lozovan, V., Pawlowski, G., Yasinskyi, M., & Ogirko, I. (2019). Improving the diagnostics of underground pipelines at oil and gas enterprises based on determining hydrogen exponent (PH) of the soil media applying neural networks. *Eastern-European Journal of Enterprise Technologies, 4*(5), 56–64. doi: 10.15587/1729-4061.2019.174488

2. Yuzevych, L., Yankovska, L., Sopilnyk, L., Yuzevych, V., Skrynkovskyy, R., Koman, B., Yasinska-Damri, L., Heorhiadi, N., Dzhala, R., & Yasinskyi, M. (2019). Improvement of the toolset for diagnosing underground pipelines of oil and gas enterprises considering changes in internal working pressure. *Eastern-European Journal of Enterprise Technologies, 6*(5), 23–29. doi: 10.15587/1729-4061.2019.184247

3. Yuzevych, L., Skrynkovskyy, R., & Koman, B. (2017). Development of information support of quality management of underground pipelines. *EUREKA: Physics and Engineering, 4*, 49–60. doi: 10.21303/2461-4262.2017.00392

4. Gormley, C., & Tong, Z. (2015). *Elasticsearch The Definitive Guide: A Distributed Real-time Search and Analytics Engine*. Retrieved from http://stmarysguntur.com/wp-content/uploads/2019/04/1021302647.pdf

5. Kononenko, O., Baysal, O., Holmes, R., & Godfrey, M. W. (2014). Mining modern repositories with elasticsearch. *Proceedings of the 11th Working Conference on Mining Software Repositories*, 328–331. doi: 10.1145/2597073.2597091

6. Taylor, R., Ali, M. H., & Varley, I. (2018). Automating the processing of data in research. A proof of concept using elasticsearch. *International Journal of Surgery, 55*, S41. doi: 10.1016/j.ijsu.2018.05.179

7. Elastic. (n. d.). *Bulk API*. Retrieved from https://www.elastic.co/guide/en/elasticsearch/reference/current/docs-bulk.html

8. Amazon Web Services. (n. d.). *Analysing Text with Amazon Elasticsearch Service and Amazon Comprehend*. Retrieved from https://aws.amazon.com/solutions/implementations/text-analysis-with-amazon-opensearch-service-and-amazon-comprehend/

9. AKCA, M. A., Aydoğan, T., & İlkuçar, M. (2016). An Analysis on the Comparison of the Performance and Configuration Features of Big Data Tools Solr and Elasticsearch. *International Journal of Intelligent Systems and Applications in Engineering, 4*(Special Issue-1), 8–12. doi: 10.18201/ijisae.271328

10. Bahls, D., Zapilko, B., & Tochtermann, K. (2013). A Data Restore Model for Reproducibility in Computational Statistics. *Proceedings of the 13th International Conference on Knowledge Management and Knowledge Technologies, Article No. 13*, 1–18. doi: 10.1145/2494188.2494205

11. Amazon Web Services. (2023). *Amazon OpenSearch Service: Developer Guide*. Retrieved from https://docs.aws.amazon.com/opensearch-service/latest/developerguide/opensearch-service-dg.pdf#managedomains-snapshots

12. Mane, D., Chitnis, K., & Ojha, N. (2013). The spring framework: an open source java platform for developing robust Java applications. *Journal of Innovative Technology and Exploring Engineering, 3*, 137–143.

13. Thacker, U., Pandey, M., & Rautaray, S. S. (2017). Review of Elasticsearch Performance Variating the Indexing Methods. *Progress in Intelligent Computing Techniques: Theory, Practice, and Applications*, 3–8. doi: 10.1007/978-981-10-3376-6_1

14. Thomas, M. A., & Redmond, R. T. (2009). From the Client-Server Architecture to the Information Service Architecture. *AMCIS 2009 Proceedings*. 115.

15. Wu, W., Kang, R., & Li, Z. (2015). Risk assessment method for cyber security of cyber physical systems. *2015 First International Conference on Reliability Systems Engineering*. doi: 10.1109/icrse.2015.7366430

16. Elastic. (n. d.). *Quantitative Cluster Sizing*. Retrieved from https://www.elastic.co/elasticon/conf/2016/sf/quantitative-cluster-sizing

17. Tencent Cloud. (2022). *Elasticsearch Service Best Practices Product Documentation*. Retrieved from https://main.qcloudimg.com/raw/document/intl/product/pdf/845_16596_en.pdf

A Sentiment Analysis Approach on the Acceptance of Radio Frequency Identification Technology-Based Solutions among Schools in Nueva Ecija, Philippines

Cris Norman Olipas [1]

[1] *Nueva Ecija University of Science and Technology*
Sumacab Este, Cabanatuan City, 3100, Philippines

DOI: 10.22178/pos.89-3

LCC Subject Category: L7-991

Received 17.11.2022
Accepted 28.01.2023
Published online 31.01.2023

Corresponding Author:
olipas.cris@gmail.com

© 2023 The Author. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. Integrating new technologies in schools improves different processes and increases trust and confidence from various stakeholders. Advancements in education are a 21st-century goal that every learning institution should consider. This study aims to conduct sentiment analysis on the acceptance of Radio Frequency Identification technology-based solutions among the private and public learning institutions in Nueva Ecija, Philippines, that have implemented the technology. School administrators and teachers participated in the study. Sentiments were analyzed using open-ended questions relating to their acceptance of the technology. Based on the analysis, more favourable terms occurred in their responses than negative words, as presented using a word cloud. The researcher thinks that school administrators and teachers of today are more open to technological progress and integrating technologies into education to improve the quality of processes, improve the delivery of instruction, create a safer and more secure learning environment, and encourage the use of new technologies to raise the quality of teaching and learning.

Keywords: Radio Frequency Identification; Sentiment Analysis; Technology Acceptance; Technology Implementation; Technology Integration.

INTRODUCTION

The quality of education and the delivery of instruction in different parts of the world have significantly evolved through the years because of technological advancements. Technological advancements involve significant improvement and innovation in other areas and industries where new scientific knowledge is used [1]. In the field of computing, technological advances have been extensively observed. People are looking for new ways to do things, especially in software development and automation, machine learning, artificial intelligence, the internet of things, and big data. Hence, new products were made.

The field of information and communications technology (ICT) has contributed significantly to this evolution and has had an impact on how quality education has been delivered to every learner. At the onset of the global pandemic called the coronavirus 2019 (COVID-19), learning institutions immediately devised solutions to continuously provide quality instruction to every learner while ensuring the utmost safety of everyone. Different ways of learning were used to ensure that education continued [2].

ICT has played a crucial role in this development. Integrating new technologies at schools has paved the way for new information technology solutions and products to be developed and improved. One of which is the implementation of radio frequency identification (RFID) technologies.

Radio Frequency Identification Technology (RFID). RFID technology is also known as "electronic label technology". It is a non-contact automated identification technology that recognizes the target object and extracts relevant data and critical characteristics using radio frequency signals [3]. RFID is an example of an automatic identification and data collection (AIDC) technology. AIDC automatically captures the stored data using dedicated devices. Authors [4] wrote about the use of

AIDC technology and how it could be used to improve school operations.

During COVID-19, keeping your distance and not getting too close to other people is essential. This will help stop the virus from spreading. Putting this kind of technology into schools not only keeps students safe but also helps reach the goal of making schools into "smart campuses."

Higher learning institutions are gearing up to become "smart campuses" in the Philippines. The Commission on Higher Education (CHED) has provided means and support for these institutions to achieve this significant milestone in higher education. CHED defines smart campuses as "spaces where higher education institutions use next-generation digital technologies woven seamlessly with a well-architected infrastructure," which may lead to more significant improvements in the quality of teaching and learning, research and extension, and operational efficiency" [5].

Implementing new technologies in schools is a timely response to the call for improving the quality of education. This action is also a response to the United Nations Sustainable Development Goal No. 4 (SDG 4) [6], which says that learning institutions must "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" to improve the quality of one's life, the state of one's community, and help build a better world for the next generation.

Technology Integration in Education. Technology integration in schools is developing, utilizing, and implementing innovations that can improve school operations and management, curriculum, delivery of instruction, the overall student learning experience, and relationships with stakeholders. Technology integration also means using things like computers, laptops, cell phones, cameras, online platforms, and other tools in the classroom [7].

In recent years, several technologies have been successfully integrated into the teaching and learning process, as well as school administration and operation. Using learning management systems, videoconferencing technologies, online workspaces, and electronic learning materials has improved students' academic performance during the teaching and learning process. Several automated systems have been used to run and manage schools. These are the admissions and enrollment system, the grading system, the payment and accounting system, the library system, and the guidance management system.

In addition, RFID technology has been employed to ensure the safety of every student in school. It has been implemented to use RFID in student identification cards to monitor and track their entry and exit from school. Additional capabilities, such as sending text messages to their parents or guardians, are incorporated into these technologies. This technology-enhanced school safety and security bolstered stakeholder confidence and enhanced children's academic performance and overall learning experiences.

While technology integration provides many benefits, several challenges and difficulties may also be encountered. Some of the factors and barriers influencing technology integration have been expressed by [8]. Authors [8] suggested ways to reduce the obstacles and challenges of integrating technology, such as improving digital technology pedagogies, putting in place directives to build "net" skills, changing school curricula, and increasing the number of training and workshops to help people learn how to use technology better.

Implementing RFID in Schools. Over the years, different learning institutions in the province of Nueva Ecija, Philippines, have adopted other technologies. One of which is the implementation of RFID. While this technology has been developed to benefit schools, several learning institutions have immediately stopped its performance for several reasons.

The discontinuity factors can be put into four broad groups: problems and challenges in institutional, economic, social, and technological areas. Even though there may have been problems, it is essential to know how the RFID implementation affected the different learning institutions in the province. This will give readers a better idea of how various stakeholders feel about the technology and help them understand it better. By understanding how technology integration affects schools, readers can better understand how it should be used to ensure it lasts.

One effective measure to identify the impact of implementing technologies in schools is to determine the sentiments of different stakeholders. Through ideas, future technological projects can be further improved based on how stakeholders accept and adopt them.

Sentiment Analysis. Generating subjective data from original material to gain insights and a deeper understanding of individuals' perspectives is called "sentiment analysis" [9]. The term "opinion mining" or "emotional AI." is frequently utilized to refer to this approach. Employing sentiment analysis, one can ascertain the underlying disposition of a piece of text, which may be positive, negative, or neutral [10].

Figure 1 depicts the process flow of sentiment analysis based on work conducted by [11].

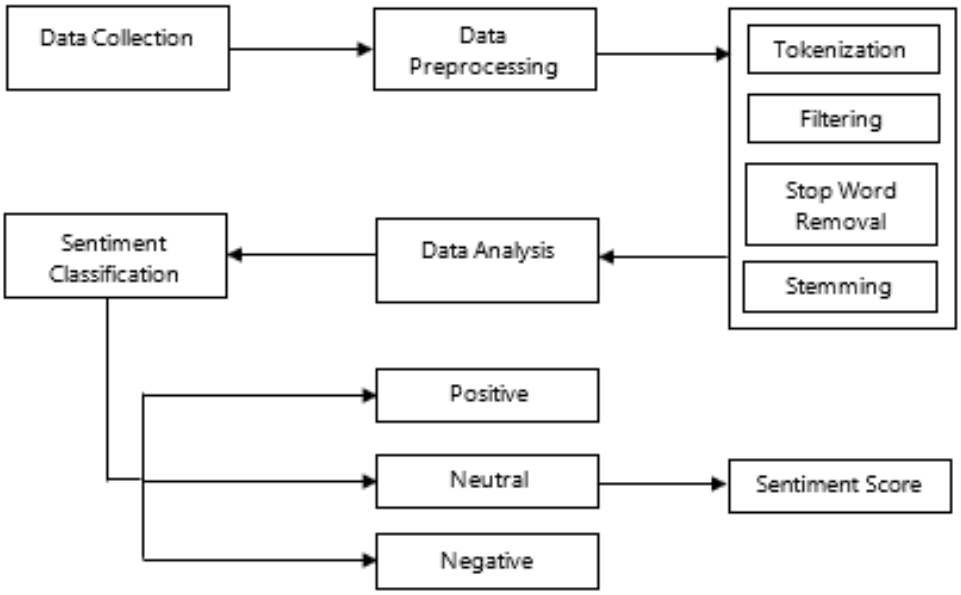


Figure 1 –Process Flow of Sentiment Analysis

It is possible to make use of a variety of approaches that involve sentiment classification. Hybrid, lexicon-based, and machine learning (ML) methods are some ways to do this.

The analysis in a machine learning approach is centred on creating classifiers from training examples of textual data. This data is used to train the machine. Supervised and unsupervised learning are included in the conventional approach to machine learning [12]. On the other hand, lexicon-based sentiment analysis is a type of data analysis in which opinion words and phrases are used in the analysis without any prior knowledge being required. The thoughts and feelings are gathered and organized. Within the framework of the lexicon-based methodology, the term "opinion lexicon" refers to the collection of positive and negative words and opinion phrases. In a method based on lexicons, both unlabeled data and dictionaries are used [13]. The final type of method is known as a "hybrid approach," a combination of lexicon and machine learning methods. Authors [14] showed that performance and classification are improved when the two strategies are used together.

Sentiment analysis is needed to understand how different groups of people feel about a new technology, like RFID, that has just been introduced.

Utilizing this methodology, one can gain insightful knowledge that can be applied to enhance technology, processes, and activities. In addition, sentiment analysis offers a platform for deriving valuable meaning about how various stakeholders feel about the technology. This makes it possible to solve problems and bring about long-term technological projects.

This research investigates the impact of implementing RFID technology in private and public schools within the province of Nueva Ecija in the Philippines. The sentiment analysis illustrates how various stakeholders feel about the technology and whether those feelings are positive, negative, or neutral. In addition, the frequency of the common words is visualized so that a general picture of how the participants feel about the technology can be obtained.

In general, this study aimed to analyze the impact of RFID among schools in Nueva Ecija, Philippines. Specifically, it aimed to:

1) Visualize the common words that appeared in the responses of the participants; and to

2) Determine the sentiments of school administrators and teachers on implementing RFID technology.

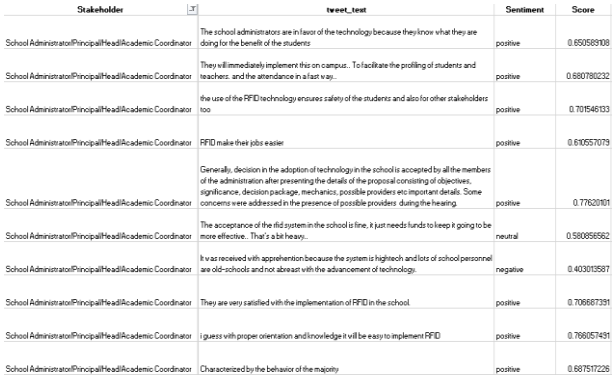
METHODS

Research Design. In this particular study, a qualitative research approach was employed. The researcher was able to use the texts to provide insights and draw significant conclusions based on the responses given by the participants. This design collects data in a qualitative, non-quantitative way by asking open-ended questions to learn more about the subject [14].

Participants of the Study. The participants of this study were composed of 94 school administrators and 121 teachers from private and public learning institutions in Nueva Ecija, Philippines, that had implemented RFID technologies. To better understand the term, "school administrator" means personnel with administrative designations such as the school head, academic coordinators, academic heads, department heads, and subject coordinators. Teachers are classroom teachers, which means they spend the majority of their time at school teaching.

Data Analysis. In analyzing the collected responses from the open-ended questions answered by the participants of this study, sentiment analysis was used. It uses natural language processing, text analysis, computational linguistics, and biometrics to find, extract, measure, and study affective states and personal information [10].

The first goal of this study was to create a visual representation of the common words that appeared. After cleaning the data, the familiar terms and keywords were extracted. This was then visualized using a word cloud. Following the processes presented in Figure 1, the researcher identified if the responses yielded positive, neutral, or adverse results using the Azure Machine Learning tool. Azure Machine Learning is a powerful tool that can be used to analyze textual data and identify the sentiments of participants. Figures 2–3 present the sample interface where the feelings were identified, including the sentiment scores.



Stakeholder	tweet_test	Sentiment	Score
School Administrator/Principal/Head/Academic Coordinator	The school administrators are in favor of the technology because they know what they are doing for the benefit of the students	positive	0.650589308
School Administrator/Principal/Head/Academic Coordinator	They will immediately implement this on campus.. To facilitate the profiling of students and teachers. and the attendance in a fast way..	positive	0.680780232
School Administrator/Principal/Head/Academic Coordinator	the use of the RFID technology ensures safety of the students and also for other stakeholders too	positive	0.70154633
School Administrator/Principal/Head/Academic Coordinator	RFID make their jobs easier	positive	0.610557079
School Administrator/Principal/Head/Academic Coordinator	Generally, decision in the adoption of technology in the school is accepted by all the members of the administration after presenting the details of the proposal consisting of objectives, significance, decision package, mechanics, possible providers etc important details. Some concerns were addressed in the presence of possible providers during the hearing.	positive	0.77620101
School Administrator/Principal/Head/Academic Coordinator	The acceptance of the rfid system in the school is fine, it just needs funds to keep it going to be more effective.. That's a bit heavy..	neutral	0.580856562
School Administrator/Principal/Head/Academic Coordinator	It w as received with apprehention because the system is hightech and lots of school personnel are old-schools and not abreast with the advancement of technology.	negative	0.403013587
School Administrator/Principal/Head/Academic Coordinator	They are very satisfied with the implementation of RFID in the school.	positive	0.706687391
School Administrator/Principal/Head/Academic Coordinator	i guess with proper orientation and knowledge it will be easy to implement RFID	positive	0.766057491
School Administrator/Principal/Head/Academic Coordinator	Characterized by the behavior of the majority	positive	0.687517226

Figure 2 – Sample interface of how responses were analysed

Figure 3 – Word Cloud of the most common terms occurred

RESULTS AND DISCUSSION

Visualization of the Most Common Words from the Participants' Responses. Figure 3 presents the visualization of the most common words from the participants' responses. It is necessary to determine the terms that frequently occurred from the reactions to grasp an initial understanding of whether the acceptance and sentiments of the participants in the implementation of RFID technology are positive, negative, or neutral.

Based on the visualization of the most common words from the responses of the participants, the following positive insights were drawn:

1. The school administrators and the teachers accept the implementation of RFID technology because it provides an easier means to monitor, track, and improve the quality of recording the attendance of students going in and out of the school.

2. The RFID technology contributes to strengthening the level of security in schools, resulting in a better learning experience for the students, increasing trust from parents and guardians, and promoting a safer learning environment.

3. RFID technology makes it easier to communicate with stakeholders, keep track of student information, and promote digitalization in schools.

However, based on the words that frequently occurred, the following negative insights were extracted:

1. The lack of proper training for personnel may lead to long-term problems with implementing the technology.

2. There is a need to prepare and make the students and other stakeholders aware of the implementation of RFID technology.

3. The cost of implementing the technology and the need to sustain it are needed to maximize the potential benefits of the technology in the long run.

For every technology being implemented, positive and negative aspects are observed. While favourable terms affirm the proponents of the technologies being implemented, it is valuable to consider the negative factors so that they can be quickly addressed and solved immediately, causing the technology to be implemented and sustained further.

Technologies can be a double-edged sword that can bring people together or tear them apart. For instance, social media platforms can be a source of collaboration among people from different walks of life but can also cause individuals to be divided and separated. While new technologies may provide up-to-date information, it is necessary to filter and analyze it to determine whether it is legitimate and relevant. Indeed, new technologies have their pros and cons.

Both positive and negative impacts have been observed in applying RFID in a school setting. It is then the responsibility of school administrators to carefully craft policies that would contribute to achieving positive goals with the technology and lessen its negative impact on the community.

The Sentiments of the Participants on the Implementation of RFID Technology. Figure 4 shows the participants' sentiments on implementing RFID technology. Views can be categorized as positive, negative, or neutral.

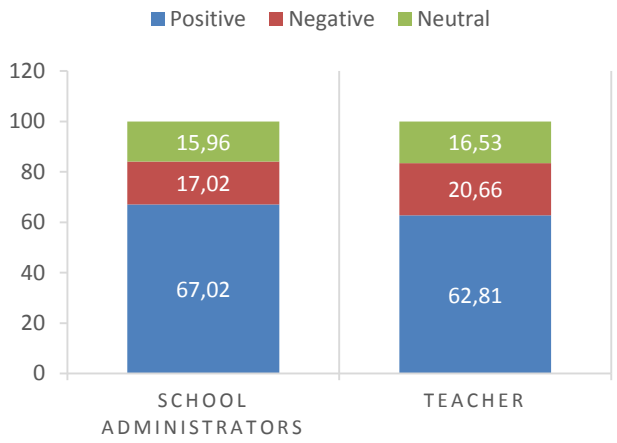


Figure 4 – Sentiments on the Implementation of RFID Technology

According to the findings of the sentiment analysis that was carried out, it was discovered that the participants have favourable feelings regarding the utilization of RFID technologies in academic institutions. According to the number shown above, it was clear that 67.02% of the school officials and 62.81% of the educators accept the technology positively. The participants' optimistic perspectives lend credence to putting such technology in place to maximize its advantages on the educational institution, its students, and other external stakeholders.

On the other hand, 17.02% of school officials and 20.66% of educators feel unhelpful about the technology. This result can serve as a foundation for improving the technology's implementation. These unfavourable feelings shouldn't be interpreted as an indication of rejection of the technology; instead, they should be seen as a potential to hone and perfect the process of putting it into practice. The unfavourable emotions that have been communicated can also serve as a foundation for addressing the difficulties encountered to lessen and eventually reduce them.

All positive, negative, or neutral responses contribute to a better understanding of how teachers and school administrators feel about implementing new technology. This can also serve as the foundation for intervention strategies and solutions that aim to lessen the prevalence of negative feelings and, ultimately, eliminate them.

CONCLUSIONS

This study aimed to research the acceptance of RFID-based solutions among private and public

schools in Nueva Ecija, Philippines, to understand better how teachers and school administrators feel about implementing the technology. The results of the open-ended questions asked to the participants were analyzed using a "word-cloud" tool, which allowed for a visual representation of the words used most frequently in those responses. In addition, Azure Machine Learning was used to conduct sentiment analysis to understand better how the participants felt about the technology. Positive, negative, and neutral are the three categories that describe people's feelings.

A word cloud was utilized to help illustrate the findings, demonstrating that the participants' responses included favourable terms related to their acceptance of the technology. In addition, the responses revealed a greater prevalence of positive feelings. This indicates that most school administrators and teachers favour implementing technology in school and the teaching-and-learning process.

In light of these findings, the following suggestions were provided as possible next steps:

Word clouds and sentiment analysis can be beneficial tools for determining how various stakeholders feel about a particular technology. After this, it is suggested to potential future researchers that they validate the acceptance using multiple other methods.

In future studies, in addition to the views and opinions of school administrators and teachers, the perspectives and feelings of students and their parents may also be incorporated.

The significance of this study is that it contributes to a deeper comprehension of the perspectives held by educational institution administrators and teachers regarding the application of technological advances in educational settings. Since this particular group of stakeholders is generally open to incorporating technological advancements in schools, implementing other technologies becomes much more straightforward.

Further, positive acceptance of technology may lead to better delivery of instructions and improve the quality of the teaching and learning process.

REFERENCES

1. Comunale, J., & Wood, D. (2022, February 17). *What is technological advancement? Benefits and risks*. Retrieved from https://study.com/academy/lesson/scientific-research-technological-advancements-risks-benefits.html
2. Yang, D., & Beam, E. (2021). *Bridging the learning gaps in the time of COVID: Exploring teaching at the right Level with the Philippine Department of Education*. Retrieved from https://www.povertyactionlab.org/initiative-project/bridging-learning-gaps-time-covid-exploring-teaching-right-level-philippine
3. Abugabah, A., Sanzogni, L., Houghton, L., Ali AlZubi, A., & Abuqabbeh, A. (2022). RFID Adaption in Healthcare Organizations: An Integrative Framework. *Computers, Materials & Continua, 70*(1), 1335–1348. doi: 10.32604/cmc.2022.019097
4. Adriano, L. (2021, June 24). *Smart campus rises in Ilocos Norte*. Retrieved from https://www.pna.gov.ph/articles/1144817
5. Olipas, C. N. P., & Esperon, R. M. (2020). The design and development of a cashless payment system with an automatic identification and data collection (AIDC) technology. *International Journal of Scientific and Technology Research,* 9(3), 6718–6723.
6. UNESCO. (2020). *2020 Global education monitoring report*. Retrieved from https://gem-report-2020.unesco.org
7. Edutopia. (2007, Octeber 19). *How does project-based learning work? Tools for understanding the process of planning and building projects*. Retrieved from https://www.edutopia.org/project-based-learning-guide-implementation
8. Pelila, J. R. O., Bag-ongan, Q. F. L., Talania, J. L. P., & Wakat, G. S. (2022). Factors and Barriers Influencing Technology Integration in the Classroom. *Journal of Language Education and Educational Technology, 7*(1), 1. doi: 10.33772/jleet.v7i1.18704

9. Gupta, S. (2018, January 7). *Sentiment analysis: Concept, analysis, and applications*. Retrieved from https://towardsdatascience.com/sentiment-analysis-concept-analysis-and-applications-6c94d6f58c17

10. Hamborg, F., & Donnay, K. (2021). NewsMTSC: A Dataset for (Multi-)Target-dependent Sentiment Classification in Political News Articles. *Proceedings of the 16th Conference of the European Chapter of the Association for Computational Linguistics: Main Volume*. doi: 10.18653/v1/2021.eacl-main.142

11. Verma, B., & Thakur, R. S. (2018). Sentiment Analysis Using Lexicon and Machine Learning-Based Approaches: A Survey. *Proceedings of International Conference on Recent Advancement on Computer and Communication*, 441–447. doi: 10.1007/978-981-10-8198-9_46

12. Medhat, W., Hassan, A., & Korashy, H. (2014). Sentiment analysis algorithms and applications: A survey. *Ain Shams Engineering Journal, 5*(4), 1093–1113. doi: 10.1016/j.asej.2014.04.011

13. Wan, X. (2008). Using bilingual knowledge and ensemble technique for unsupervised Chinese sentiment analysis. In *Proceedings of the 2008 Conference on Empirical Methods in Natural Language Processing* (pp. 553–561). Honolulu: Association for Computational Linguistics.

14. Sindhwani, V., & Melville, P. (2008). Document-Word Co-regularization for Semi-supervised Sentiment Analysis. *2008 Eighth IEEE International Conference on Data Mining*. doi: 10.1109/icdm.2008.113

15. Pawar, N. (2020, December). Type of research and type research design. In *Research methodology: An overview* (pp. 46–57). Retrieved from https://www.researchgate.net/publication/352055750_6_Type_of_Research_and_Type_Research_Design

The Knowledge, Attitude, and Practice of Core Values in a Learning Institution in the Philippines: A Basis for a Plan of Action

Cris Norman Olipas [1]

[1] *Nueva Ecija University of Science and Technology*
Sumacab Este, Cabanatuan City, 3100, Philippines

DOI: 10.22178/pos.89-5

LCC Subject Category: L7-991

Received 01.12.2022
Accepted 28.01.2023
Published online 31.01.2023

Corresponding Author:
olipas.cris@gmail.com

© 2023 The Author. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. This study aimed to assess the respondents' knowledge, attitude, and practice regarding stewardship, empowerment, empathy, discipleship, and solidarity. It provides a concrete discussion as to how the learning institution in Nueva Ecija, Philippines, was able to affect their students and how they internalised these core values. A descriptive research design was used in this study. The respondents comprised 61% male and 39% female students from the junior high, senior high, and college departments. Statistical data analysis technique was used. Results significantly revealed that the student's knowledge, attitude, and practice in the core values under investigation are highly evident. This means that the learning institution was effective and efficient in conducting activities that integrated these core values so that the students could internalise and practice them through their thoughts, feelings, and actions. The findings suggest that programs and activities must be crafted in the future to ensure that the core values are still effectively integrated for their continuous realisation.

Keywords: Assessment; Attitude; Core Values; Knowledge; Practice.

INTRODUCTION

The 21st century emphasises unrelenting expansion and development across community life. Sustainable development is one of the most critical factors determining whether or not a culture is prosperous.

Many avenues can be pursued to achieve sustainability. It can be present in various parts of an organisation, ranging from straightforward management processes to the most intricate approaches to managing the organisation. The establishment of an organisation's core values is one factor that contributes to its continued viability. The core values of an organisation are the cornerstones that it upholds. It teaches individuals about the ethical responsibility they bear and contributes to the shaping of individuals on a holistic level, including how individuals behave.

Every individual who joins an organisation does so based on a predetermined set of standards and beliefs regarding why they joined the organisation. One of these factors is the organisation's vision and mission, which stem from the core values defined for the organisation. The leaders of an organisation seek out capable members of the community so that the organisation can fulfil its vision and mission. It is essential for individuals who are interested in joining a company to possess not only behavioural or life skills competencies but also functional or technical competencies as well as a level of expertise [1-2].

As mentioned, one factor contributing to an organisation's success is its technical competencies. It is essential; leaders should invest in it and work to improve it. However, besides technical skills, organisations should pay attention to correctly running an organisation. This underlying element is the significance of core values in people's behavioural or life skills competencies.

Core Values in Organisations. The success of an organisation is dependent on several factors, including its core values. Establishing a robust core value system can have a beneficial effect that lasts for a significant amount of time in an organisation. Author [3] asserts that the core values of a company provide support for the company's vision, help shape the culture of the company, and reflect the importance of the company. In

addition, core values assist businesses in making decisions, educating customers and retaining mechanisms.

An organisation's core values direct the organisation's vision, contribute to the formation of the organisation's culture and reveal the things the organisation places a premium on. A robust and well-defined set of core values has a beneficial effect and benefits an organisation beyond its walls.

When making decisions, a company or organisation can benefit from having strong core values. It is simple to find solutions when one is guided by the principles that stem from the established core values, and one can be sure that the decisions reached were correct. Clarifying an organisation's status and maintaining its integrity can also be accomplished by educating stakeholders about the group's mission and focusing on its core values. In conclusion, core values are the characteristics all members uphold and are expected to display in their daily lives [5].

Fundamental Principles of Core Values. According to [6], a study conducted to discover the principles underpinning the corporate brand uncovered five insights.

The first thing to remember is that fundamental principles develop over time. The very existence of an organisation is inextricably bound up with its current core values. It is necessary to examine one's core values regularly and strive to improve them over time to remain competitive and successful in today's world. The company's management should pay constant attention to the meaning of the core values to prevent any deterioration, devaluation, or loss of the substance and credibility of those values. This will allow the company to achieve its optimal essence in realising its core values.

Second, for there to be values, there must first be a culture because the culture of an institution is directly related to its importance. An organisation driven by its values will find its strength, source, and foundation in the very essence of the organisation, which includes its vision, mission, goals, and objectives.

Thirdly, people construct core values one brick at a time. The importance of institutions is gradually improved through meeting the stakeholders' expectations, and the institutions' fundamental values are bolstered and become more robust as a result. The same happens when an institution faces challenges: it puts its core values to the test.

Fourthly, fundamental principles are called into question as time passes. A robust system of core values has the potential to endure the passage of time while also continuing to develop and survive. It is much simpler for an organisation to triumph over difficulties when it possesses a robust set of actual core values, as this makes it possible for the institution to be guided by the principles grounded in the core values.

Lastly, core values promote its commitment. If a fundamental principle promises that strong operational sustainability can be achieved through excellent leadership, then the promise will be fulfilled. As a result, management must ensure that the fundamental principles align with the commitments and vice versa.

Categories of Core Values. In contrast to what the majority of people believe when they hear the term "core values," which refers to a collection of admirable characteristics on which an organisation bases its principles, policies, vision, mission, and objectives, core values can be divided into four distinct categories depending on the extent to which they are implemented. An organisation's core values can be either genuine, aspirational, potential, or hollow [6].

For actual core values, the organisation must make a conscious effort to instil its core values so that they can be recognised and appreciated by its various stakeholders over time. This signifies that such fundamental principles have become ingrained in the minds and actions of stakeholders to the point where they have remained unchanged over time.

On the other hand, aspirational core values are deeply ingrained in the organisation, but they still need to be recognised and comprehended by the various stakeholders. These fundamental principles have a high level of internal realisation but are not recognised by the outside world.

Customers are aware of and appreciative of potential core values, but these values are not incorporated into the institution's identity. The aspirational core values are opposed to categorising a core value prioritising achievement. This is the fundamental principle the stakeholder may recognise and acknowledge, even though it is no longer central to the institution's overarching goals and objectives.

The final classification of core value is "hollow core value." Core values that are lacking in substance lack not only an internal foundation but also the appreciation and acceptance of stakeholders. Author [6] emphasises that if an organisation possesses a hollow core value, it would be preferable for the institution to revise, enhance, or develop a new one to keep up with the challenges and continue growing over time. This is because an organisation can't remain static in constant change.

The Knowledge, Attitude, and Practice of Core Values. Knowledge of an organisation's core values refers to the degree to which its stakeholders, and students in particular, have an understanding of the significance of the values that the educational institution upholds that they attend. The term "attitude" refers to students' feelings regarding certain fundamental principles, which are then reflected in how they behave inside and outside the classroom. Moreover, "practice" refers to how students can effectively apply the principles their educational establishment instils.

To get a better understanding of whether or not these guiding principles can indeed be seen in the knowledge, attitude, and practice of each member of the organisation, educational institutions are encouraged to evaluate how well stakeholders are informed about their core values, what those stakeholders' attitudes are regarding the core values, and how well stakeholders act by these core values. Author [4] emphasises the significance of core values because they work as directing principles for words and deeds and identifiers of a person. Further, core values identify organisational culture. Because of this, it is essential to have a deep understanding of how stakeholders support the organisation's core values.

A learning institution in Nueva Ecija, Philippines, promotes stewardship, empowerment, empathy, discipleship, and solidarity. These core values were integrated into different programs and activities of the learning institutions. However, there is a need to assess how students know, feel, and act according to these core values to provide a basis for strengthening the positive aspects and improving the activities and programs of the learning institution for a more holistic student learning experience.

Furthermore, while there are several available literature, there is still a growing need to conduct studies relating to evaluating students' knowledge, attitude, and practice concerning a learning institution's core values.

The objective of the researcher is to contribute to the growing body of research that has been done on this subject as well as to strengthen the existing research that has been done on assessing core values so that educational leaders can gain significant insight and understanding that may be suitable for the context of their organisations, especially in the school setting.

This study aimed to assess students' knowledge of, attitudes toward, and practice of core values promoted by a learning institution in Nueva Ecija, Philippines. Specifically, it sought to

1. Describe the knowledge, attitude, and practice of the students on the core values of Stewardship; Empowerment; Empathy; Discipleship; Solidarity.

2. Discuss the implications of the assessment made in teaching and learning and school administration.

3. Describe the conduct of creating a plan of action based on the assessment made.

METHODS

In this study, a descriptive research design was utilised to describe the knowledge, attitudes, and practices of the core values of stewardship, empowerment, empathy, discipleship, and solidarity among the students enrolled in junior high, senior high, and college. The researcher analysed and adequately described the gathered data from the respondents using various statistical approaches. This research approach aims to provide a more in-depth description and analysis of an ongoing endeavour or existing phenomenon.

The number of people who participated in the survey was broken down into three distinct groups: junior high school, senior high school, and college. There were 89 male students, 61% of the total respondents, and 57 female students, 39%. They came from the junior high school department proportion of 34.2%, the senior high school department proportion of 33.6%, and the college department proportion of 32.2%.

The research instrument was modelled after [7]'s study, but it was altered to apply to the current investigation. To ensure that the items were consistent with one another on an internal level, they

were evaluated for their content validity and reliability.

To get permission from the school's administration to conduct the research, proper communication letters were handed out by the researcher before collecting data from the respondents. After the researcher obtained the necessary permissions, the study officially began.

At various points, the research instruments were distributed among the three departments. The researcher began by assuring the respondents that their participation in the study was optional and that they would suffer no adverse effects due to their involvement. In addition, the researcher assured them that their participation would be kept in strict confidence. The respondents' responses were held in the strictest confidence throughout the investigation. It was also stated that no personally identifying information was gathered from participants to guarantee that their participation remained anonymous and confidential.

RESULTS AND DISCUSSION

The Students' Knowledge, Attitude, and Practice of Stewardship. Stewardship is an ethical value that refers to the careful organisation and administration of different resources. It is the theological idea that humans are accountable for the entire world and should care for and look after it. The practice of stewardship encourages accountability and the responsible global governance of various resources. It is the responsibility that has been given to humanity: to find ways to take good care of all the natural wonders on this planet.

Table 1 presents the result of the assessment made by the respondents on their knowledge, attitude, and practice regarding the value of stewardship.

Table 1 – The knowledge about the core value of stewardship

Item Statements	Mean	Verbal Interpretation
SK1	3.80	Strongly Agree
SK2	3.42	Agree
SK3	3.39	Agree
SK4	3.58	Strongly Agree
SK5	3.53	Strongly Agree
Grand Mean	3.54	
Verbal Description	Very Highly Evident	

The results of an assessment carried out by the respondents who participated in the survey to determine how well they understood the fundamental importance of stewardship are shown in Table 1. The table demonstrates that, on average, the students have a very high level of knowledge about stewardship (μ = 3.54), as can be seen. More specifically, the respondents expressed their conviction, as a direct result of their comprehension of the significance of good stewardship, that creation is God's way of saying the goodness He possesses (μ = 3.80). The respondents are also aware that God has entrusted the earth's goods to them (μ = 3.80), which is a responsibility they take very seriously. According to the assessment results, the respondents understand the necessity of caring for the earth and its resources (μ = 3.53). In addition, respondents stated that they believed the distribution of the world's resources is required for long-term sustainability and that they have a responsibility as stewards of the creation (μ = 3.39; μ = 3.42).

The assessment results demonstrate that the respondents have significant knowledge of stewardship. This is shown by how they understand its value, enabling them to use it in their lives better.

Table 2 shows the assessment results that asked respondents how they felt about stewardship as an essential principle.

Table 2 – The attitude about the core value of stewardship

Item Statements	Mean	Verbal Interpretation
SA1	3.66	Strongly Agree
SA2	3.45	Agree
SA3	3.40	Agree
SA4	3.55	Strongly Agree
SA5	3.30	Agree
Grand Mean	3.47	
Verbal Description	Highly Evident	

According to Table 2, the respondents' assessment of the fundamental importance of stewardship reveals a high level of attitude, as demonstrated by the computed mean rating of 3.47. If respondents have a high level of attitude toward stewardship, they regard it highly in terms of their perspectives. The respondents claimed to understand that all living things need to be cared

for so that subsequent generations can enjoy the earth's bounty (μ = 3.66). They are also unanimous in their belief that they must answer God's call to stewardship to maintain justice, peace, and the integrity of creation (μ = 3.55). The evaluation results showed that the respondents agree that sharing available resources for the benefit of all is a concrete manifestation of their positive attitude towards being good stewards (μ = 3.45), as revealed by the assessment results. The respondents also stated that they use resources efficiently and effectively for the benefit of all human beings (μ = 3.40) and that they commit and pledge their time, talents, and treasures to their community and the church (μ = 3.30).

The findings indicate that the respondents' attitude regarding the significance of stewardship is significantly manifested and can be observed based on how they perceived the presented items.

The assessment that the student respondents made regarding how they uphold the stewardship value is presented in Table 3.

Table 3 – The practice of the core value of stewardship

Item Statements	Mean	Verbal Interpretation
SP1	3.80	Strongly Agree
SP2	3.61	Strongly Agree
SP3	3.40	Agree
SP4	3.28	Agree
SP5	3.38	Agree
Grand Mean	3.49	
Verbal Description	Highly Evident	

The practice of a core value results from how well one is knowledgeable and feels about it. As presented in table 3, the assessment development revealed that the student-respondent's practice on the value of stewardship is highly evident. This suggests that they apply in their day-to-day activities the discount under assessment.

Specifically, the student-respondents expressed that they strongly agree with the practice of leading to create and re-create the world as they stand in reverence of God and their fellow creatures (μ = 3.80). Also, the student-respondents strongly agree that they are fully aware that God entrusted the world to be used in a manner that respects each creature's inherent dignity and value (μ = 3.61). The student-respondents also expressed that they fulfil their task as co-creators and strive to complete creation through their actions and prayers (μ = 3.40). As concrete evidence of their practice about the value of stewardship, the student-respondents also participate in parish religious education programs for children and adults (μ = 3.28) and that they practice consistent moral values in all areas of their lives (μ =3.38).

The presented positive assessment and very evident too, very highly clear knowledge, attitude, and practice on the core value of stewardship show that respondents are trained to become good stewards and are encouraged to become accountable, responsible, and valuable community members. This further suggests that the programs and activities being conducted in the learning institution contribute to the realisation of this core value among the students.

The Students' Knowledge, Attitude, and Practice of Empowerment. Empowering a group of individuals with significantly increased authority or control over another individual or entity is known as empowerment. It is the process of making it possible for individuals to take charge of their own lives, realise their full potential, and take ownership of the work they produce. In the context of this core value, empowerment promotes responsibility, leadership, and accountability.

Table 4 presents the assessment made by the respondents about their knowledge of the core value of empowerment.

Table 4 – The knowledge about the core value of empowerment

Item Statements	Mean	Verbal Interpretation
EK1	3.47	Agree
EK2	3.53	Strongly Agree
EK3	3.23	Agree
EK4	3.27	Agree
EK5	3.31	Agree
Grand Mean	3.36	
Verbal Description	Highly Evident	

As presented in Table 4, it was highly evident that the respondents understood the fundamental importance of empowerment. Specifically, the respondents strongly expressed that they recognised their uniqueness and that they could become the best version of themselves (μ = 3.53). Also, the respondents believed that all the work

they do inside and outside school is valued by their parents, teachers, peers, and the community (μ = 3.47). Respondents also expressed that there is a leader in them waiting to be developed to provide positive change in the community (μ = 3.31). They also agree that they consider themselves significantly impacting inspiring people, including their parents, teachers, peers, and community, even at the most straightforward means they can provide (μ = 3.27). Lastly, the respondents agree that they can affect or influence different lives at school (μ = 3.23).

The results of the respondents' assessment of how they felt about the core value of empowerment are shown in Table 5.

Table 5 – The attitude about the core value of empowerment

Item Statements	Mean	Verbal Interpretation
EA1	3.66	Strongly Agree
EA2	3.34	Agree
EA3	3.45	Agree
EA4	3.32	Agree
EA5	3.54	Strongly Agree
Grand Mean	3.46	
Verbal Description	Highly Evident	

Based on the calculated mean rating of 3.46, it is evident how the respondents feel about the core value of empowerment. Respondents strongly expressed that they acknowledge that it is essential to develop their skills, talents, and knowledge in the best way possible (μ = 3.66). They also strongly mentioned that they believe they have the freedom to choose what makes them happy human beings (μ = 3.54). Respondents said they think they are involved in all aspects of teaching and learning (μ = 3.45). Hence, they have to perform well as a manifestation of their positive attitude toward empowerment. They also thought that they had a voice in decisions about classroom-related tasks and activities (μ = 3.34). This means they know that their opinions and agents contribute to their learning. Lastly, respondents assert that they consider the importance of participating in co-curricular and extracurricular activities (μ = 3.32).

In Table 6, the result of the assessment made by the respondents on how they practice the core value of empowerment is presented. Findings show that respondents strongly agree that they practice the importance of respect for others because they believe to be respected in return, it is essential to show respect too (μ = 3.56).

Table 6 – The practice of the core value of empowerment

Item Statements	Mean	Verbal Interpretation
EP1	3.42	Agree
EP2	3.27	Agree
EP3	3.42	Agree
EP4	3.56	Strongly Agree
EP5	3.45	Agree
Grand Mean	3.42	
Verbal Description	Highly Evident	

They also expressed that they work hard to see and explore their full potential with the help and guidance from their parents, teachers, peers, and the community (μ = 3.45). The respondents also practice the value of empowerment by collaborating with peers to improve their knowledge and skills and enhancing their talents through different curricular, non-curricular, and extracurricular activities at school (μ = 3.42; μ = 3.42). Lastly, the respondents agree that they participated in critical decisions affecting their lives at school and their education in general (μ = 3.27).

The respondents' highly evident and positive responses on the knowledge, attitude, and practice of the value of empowerment show that the learning institution provides different avenues for them to hone their full potential and become active contributors to positive change in the community. The assessment results further suggest that the learning institution is implementing programs and activities to realise this core value. Thus, a positive impact has significantly been observed among the students.

The Students' Knowledge, Attitude, and Practice of Empathy. The ability to understand another person's thoughts and feelings in a situation from their point of view rather than from one's perspective is what people mean when humans talk about empathy. One can demonstrate empathy by listening to comprehend, inquiring with sincere curiosity, being present when it is required, letting of biases, refraining from giving unsolicited advice, looking people in the eye, acknowledging one's feelings, and opening up about a situation that was similar to their own [8].

Table 7 presents the result of the assessment made about the respondents' knowledge of the core value of empathy.

Table 7 – The knowledge about the core value of empathy

Item Statements	Mean	Verbal Interpretation
EmK1	2.97	Agree
EmK2	2.82	Agree
EmK3	3.47	Agree
EmK4	3.25	Agree
EmK5	3.21	Agree
Grand Mean	3.14	
Verbal Description	Highly Evident	

Results revealed that the respondents' knowledge about the core value of empathy is highly evident, as supported by the computed mean rating of 3.14. Expressly, the respondents agree that they have concerned feelings for less fortunate people, especially the poorest of the poor (μ = 3.47). They also expressed that they believe they are on good terms with other people and that they can quickly go along with them (μ = 3.25). It is also essential for them to know how other people feel as a manifestation of being empathic to others (μ = 3.21). Furthermore, the respondents said they are affected when someone close to them is unhappy (μ = 2.82). In their opinion, the misfortunes experienced by other people close to them can also disturb them (μ = 2.97). These results show that the respondents know the value of being empathic.

Table 8 shows the result of the assessment of the attitudes of the respondents toward the core value of empathy.

Table 8 – The attitude about the core value of empathy

Item Statements	Mean	Verbal Interpretation
EmA1	3.44	Agree
EmA2	3.57	Strongly Agree
EmA3	2.79	Agree
EmA4	3.42	Agree
EmA5	3.22	Agree
Grand Mean	3.29	
Verbal Description	Highly Evident	

Based on the assessment, the results show that the attitude of the respondents toward the core value of empathy is highly evident, as reflected in the mean rating of 3.29. Respondents strongly agree that they like to make others feel better (μ = 3.57). They also expressed that it makes them sad and upset to see someone being treated disrespectfully (μ = 3.44). They also agree that when they see someone being mistreated, feel pity for them (μ = 3.42) and don't mind if people cry out of happiness because they feel like everyone's feelings are valid (μ = 3.22). Finally, respondents said they sympathise with people who cause their illness (μ = 2.79). These expressions of their attitude towards the core value of empathy indicate that the students recognise others' feelings.

In Table 9, the result of the assessment of the respondents' practices regarding the core value of empathy is shown.

Table 9 – The practice of the core value of empathy

Item Statements	Mean	Verbal Interpretation
EmP1	3.18	Agree
EmP2	3.02	Agree
EmP3	3.34	Agree
EmP4	3.25	Agree
EmP5	3.21	Agree
Grand Mean	3.20	
Verbal Description	Highly Evident	

As presented in Table 9, the result of the assessment describes that the practice of the core value of empathy among the respondents is highly evident. This is supported by the computed mean rating of 3.20. Specifically, the respondents expressed that they can identify when others are sad even if they do not say anything (μ = 3.34). They also agreed that they don't feel irritated when someone cries (μ = 3.25) because they thought it was an expression of one's feelings and was valid. The respondents further asserted that when they see someone upset, they help to make them feel better (μ = 3.21). When someone else is feeling excited, the respondents tend to get excited, too, because they empathise with others' feelings (μ = 3.18). Lastly, the respondents expressed that when their friends start to talk about their problems, they don't steer the conversation towards something else (μ = 3.02). These results positively show that the respondents practice empathy very well. This positive practice of the

core value is influenced by their excellent understanding and knowledge of the value and their positive attitude towards it.

The positive results on assessing knowledge, attitude, and practice of the core value of empathy suggest that the learning institution effectively integrates activities and programs to implement these values among the students. The findings further revealed that the curricular, extracurricular, and co-curricular activities, programs, and events in the learning institution under investigation are manifested and efficiently integrated and implemented. These positive results provide a model for other institutions to strive for when undertaking endeavours to realise their institutional core values.

The Students' Knowledge, Attitude, and Practice of Discipleship. Discipleship is the condition or act of becoming a good follower. In the context of being a core value, discipleship refers to the idea that one follows and abides by an institution's rules, policies, regulations, and guidelines to have a positive impact. This core value promotes obedience, reverence, and respect.

Table 10 presents the assessment results of the respondent's knowledge of the core value of discipleship.

Table 10 – The knowledge about the core value of discipleship

Item Statements	Mean	Verbal Interpretation
DK1	3.16	Agree
DK2	3.21	Agree
DK3	3.40	Agree
DK4	3.37	Agree
DK5	3.53	Strongly Agree
Grand Mean	3.33	
Verbal Description	Highly Evident	

As shown in Table 10, the respondents' general knowledge about the value of discipleship is highly evident, as reflected in the mean rating of 3.33. Specifically, the respondents strongly believe that God has a purpose for their lives (μ = 3.53). They also know what it means to love God with all of their heart, soul, and mind and that they practice it (μ = 3.4). The respondents also agreed that they understood how to grow in their faith (μ = 3.37) and sought each week to encourage, help, or perform a kind deed to help others (μ = 3.21). Lastly, the respondents agree that love, joy, peace, patience, kindness, goodness, faithfulness, gentleness, and self-control are clearly seen in their lives (μ = 3.16). Results indicate that the respondents' knowledge of the value of discipleship is genuinely evident and can be seen in their actions.

In Table 11, the result of the assessment of attitudes towards the core value of discipleship is presented.

Table 11 – The attitude about the core value of discipleship

Item Statements	Mean	Verbal Interpretation
DA1	3.27	Agree
DA2	3.29	Agree
DA3	3.34	Agree
DA4	3..40	Agree
DA5	3.40	Agree
Grand Mean	3.34	
Verbal Description	Highly Evident	

As presented in Table 11, the result of the assessment of the attitudes of the respondents toward the core value of discipleship Findings revealed that the respondent's attitude towards the core value is highly evident, as reflected in the computed mean rating of 3.34. Specifically, the respondents believed that they have the purpose of co-existing with their peers and helping to grow their faith, as well as that they do not just go to church to celebrate masses for the sake of compliance and conformance to what is expected of them (μ = 3.20; μ = 3.40). Respondents stated that they have attempted to form friendships and reach out to non-Catholics to foster strong relationships among all (μ = 3.29). They also agreed that when they do something wrong, they try to make it right before the day is over by confessing it to God and saying "sorry" to those affected (μ = 3.27). The respondents said they do not struggle to believe in the Lord (μ = 3.34). This positive manifestation and attitude reflect that the learning institution can integrate the core value of discipleship among the students in the learning institution's different activities, programs, and endeavours.

Table 12 presents the assessment results of the respondents' practices regarding the core value of discipleship.

Table 12 – The practice of the core value of discipleship

Item Statements	Mean	Verbal Interpretation
DP1	3.21	Agree
DP2	3.31	Agree
DP3	2.77	Agree
DP4	3.13	Agree
DP5	3.34	Agree
Grand Mean	3.15	
Verbal Description	Highly Evident	

The practice of the core value of discipleship among the respondents is highly evident, as supported by the computed mean rating of 3.15. Respondents agree that they set aside time each day to be alone with God in prayer, reading the Bible, and meditation (μ = 3.21). They also expressed that their times of prayer during the week included praise, adoration, worship, thanksgiving, confession, praying for others, and praying for God's work (μ = 3.31). Over the past year, the respondents have expressed that they have memorised a Bible verse each week (μ = 2.77). This practice of discipleship shows that the respondents have chosen to conform to what is good and right. Furthermore, they take an active part in the life and ministry of the church (μ = 3.13), and they get along with their family, teachers, and classmates and forgive them when they hurt them (μ = 3.34).

The good practices and actions manifest the respondents' knowledge and positive attitude toward the value of discipleship. The outcome also confirms that the activities and programs being carried out in the learning institution under investigation are clearly manifested and observed.

The Students' Knowledge, Attitude, and Practice of Solidarity. Solidarity is the connection or fellowship resulting from shared obligations and interests, whether among group members or between classes and people. The value of solidarity promotes unity among members of a community and promotes shared beliefs and principles towards the betterment and goodness of all.

Table 13 shows the results of an assessment of how well people know about the core value of solidarity.

Table 13 – The knowledge about the core value of solidarity

Item Statements	Mean	Verbal Interpretation
SoK1	3.10	Agree
SoK2	3.28	Agree
SoK3	3.27	Agree
SoK4	3.24	Agree
SoK5	3.11	Agree
Grand Mean	3.20	
Verbal Description	Highly Evident	

In general, the respondents' knowledge about the core value of solidarity is highly evident, as presented in the computed mean rating of 3.20. Specifically, the respondents thought they couldn't live alone (μ = 3.10) because they believe living in harmony is essential to having peace in the community (μ = 3.28). The respondents further expressed that they acknowledge the importance of responsibly living and sharing the world with others (μ = 3.27). The respondents additionally recognised their part in building a community of peace (μ = 3.24) and that they thought of others' worth and their value in their lives (μ = 3.11). These positive results on their knowledge about the importance of solidarity show that the respondents are well versed in its positive effects on their lives.

In Table 14, the result of the assessment of the attitudes of the respondents toward the core value of solidarity is presented.

Table 14 – The attitude about the core value of solidarity

Item Statements	Mean	Verbal Interpretation
SoA1	3.10	Agree
SoA2	3.00	Agree
SoA3	3.18	Agree
SoA4	3.25	Agree
SoA5	3.21	Agree
Grand Mean	3.15	
Verbal Description	Highly Evident	

Table 14 presents the attitude toward the core value of solidarity. Generally, the respondents' perspective toward the core value of solidarity is highly evident, as shown in the computed mean rating of 3.15. Specifically, the respondents expressed that they commit themselves to the

common good and not to selfish goals and ambitions (μ = 3.10). They also agree that they lose themselves willingly for the sake of others (μ = 3.00) and contribute to creating a sense of unity in the human family (μ = 3.18). The respondents further asserted that they are aware of being partly responsible for the plan of creation (μ = 3.25) and that they participate in the building up of community and in fostering unity (μ = 3.21). These positive results regarding the attitude toward the core value of solidarity significantly show that the respondents felt good about it.

In Table 15, the assessment of the respondents' practices regarding the value of solidarity is shown.

Table 15 – The practice of the core value of solidarity

Item Statements	Mean	Verbal Interpretation
SoP1	3.14	Agree
SoP2	3.15	Agree
SoP3	3.16	Agree
SoP4	3.08	Agree
SoP5	3.10	Agree
Grand Mean	3.13	
Verbal Description	Highly	

The respondents' practice regarding the core value of solidarity is highly evident, as shown in the grand mean of 3.13. Specifically, the respondents expressed that they could resolve differences through peaceful conversations or dialogue, which helped them grow in understanding and genuine respect (μ = 3.14). The respondents agree that they promote the rights and development of all people across communities, nations, and the world, irrespective of national boundaries (μ = 3.15). The assessment results also show that the respondents work for better treatment of persons who are poor, sick, homeless, unemployed, and refugees (μ = 3.16). They also practice the value of solidarity by seeking out opportunities to know people from other races, cultures, and religions (μ = 3.08). Lastly, they perform actions for the good of others that do not serve personal self-interest (μ = 3.10).

Implications in Teaching and Learning Process and School Administration. The assessment of the different core values significantly affects how people learn and teach and how the school is run.

For the teaching and learning process, the positive results of the assessment of the knowledge, attitude, and practice of the core values of stewardship, empowerment, empathy, discipleship, and solidarity show that the learning institution was able to incorporate them into the different activities, programs, and events that led to the realisation and actualisation of the core value. These findings imply that good management is being practised and experienced in educational institutions. Completing the core value leads to better results in teaching and learning. Furthermore, implementing the core values contributes to the student's academic performance.

For the school administration, the good practice and positive realisation of these core values affirm the efforts and activities performed by educational leaders towards the completion of the institution's vision and mission and the actualisation of the core values as reflected in the actions and practices being performed by stakeholders.

Creating a Plan of Action. Creating a plan of action based on the assessment results is necessary after determining how the students know, feel, and practice the different core values. If the respondents know more about a specific core value, they will have a better attitude toward it, and as a result, a positive action or practice can be seen.

When making a plan of action, one must consider the following: key result areas, specific goals, activities, people involved, time frame, budget, and any comments.

Key result areas, or KRAs, pertain to the broad categories that must be achieved. In this case, the core values Each core value constitutes a key result area. For each KRA, specific objectives must be identified. The purposes that must be identified must be related to the KRA. Then, in every particular goal, different activities must be planned out so they can be implemented and achieved. The number of moves is not limited to one. Instead, many activities can be listed under each objective, depending on how learning institutions wish to achieve it. Moreover, for every action, a person involved has to be identified, such as the duration of the activity and the budget involved. Remarks may be included if any.

These simple components of the plan of action strengthen the positive impact and realisation of an institution's core values. In return, a more significant impact can be attained.

CONCLUSIONS

This study aimed to assess the knowledge, attitude, and practice of a learning institution's core values. The goal is to provide better insights and a basis for an action plan. It was a descriptive study with junior high, high school, and college students.

Results revealed that the respondents' knowledge, attitude, and practice toward the different core values were highly evident. The assessments provided insights into the implications of the reviews on teaching and learning and school administration. Also, a description of how to plan action to strengthen the core values' sound effects has been given.

Based on the findings of this study, the following recommendations are given:

1. Craft programs, activities, and events, whether curricular, non-curricular, or extracurricular, strengthen the positive impact and continuous realisation of the core values among the students.

2. Conduct similar studies with more respondents at different points in time.

3. Other researchers may replicate or use this study as a foundation for conducting similar studies in the future.

REFERENCES

1. Udo, N. & Koppensteiner, S. (2004). *What are the core competencies of a successful project manager?* Paper presented at PMI® Global Congress 2004-EMEA, Prague, Czech Republic. Newtown Square: Project Management Institute.
2. Sturgess, G. (2012, December 6). *Skills vs Competencies. What's the Difference?* Retrieved from http://www.talentalign.com/skills-vs-competencies-whats-the-difference/
3. PayCor. (2022). *Company Core Values: Why have them?* Retrieved from https://www.paycor.com/7geese/#:~:text=Core%20values%20are%20what%20support,beliefs%20or%20philosophy%20of%20values.&text=Core%20values%20educate%20clients%20and,the%20identity%20of%20the%20company
4. Kirova, D. (2022). *What are Core Values, and Why are they important?* Retrieved from https://www.values.institute/what-are-core-values-and-why-are-they-important/#Organizational_Core_Values
5. Schoenlaub, N. (2015). Core value – why are they so important to your company? Retrieved from http://www.linkedin.com/pulse/core-values-why-so-important-your-company-nicolas-schuenlaub/
6. Urde, M. (2009). Uncovering the corporate brand's core values. *Management Decision, 47*(4), 616–638. doi: 10.1108/00251740910959459
7. Esperon, R. M. (2017). *Understanding the Praxis of Charisms of Stewardship, Empowerment, Empathy, Discipleship, and Solidarity among teachers and administrators: Towards A Proposed Revision of VMGO and Integration of Core Value Indicators* (Unpublished Dissertation; Saint Mary's University).
8. Ponio, J. (2022, January 28). *How to show empathy in 12 simple ways.* Retrieved from https://www.ofhsoupkitchen.org/how-to-show-empathy

The Effect of Teacher Performance and Teacher Work Motivation on Student Learning Motivation at Bungoeng Seroja Elementary School Cluster in Banda Aceh, Indonesia

Sulisyan [1], **Cut Zahri Harun** [1], **Nasir Usman** [1]

[1] *Syiah Kuala University*
Jln. Teuku Nyak Arief, Darussalam, Banda Aceh, Aceh, 23111, Indonesia

DOI: 10.22178/pos.89-6

LCC Subject Category: L7-991

Received 10.12.2022
Accepted 28.01.2023
Published online 31.01.2023

Corresponding Author:
Sulisyan
sulisyan77@gmail.com

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. The role of teacher performance and teacher work motivation is vital in students' teaching and learning processes in schools. Good teacher performance and teacher work motivation will foster learning motivation in students. The purpose of this study is to determine the following: 1) Teacher performance, teacher work motivation and student learning motivation at Bungoeng Seroja Elementary School (SD) Cluster in Banda Aceh; 2) The effect of teacher performance on student learning motivation; 3) The effect of teacher work motivation on student learning motivation.

This research uses a quantitative approach with an associative type of research. Data collection techniques use observation, questionnaires, and documentation. The data analysis technique used is a simple linear regression analysis by conducting validity tests, reliability tests, normality tests, linearity tests, and hypothesis tests. The results of this study show that there is a positive and significant influence of teacher performance on student learning motivation, and there is a positive and considerable influence of teacher work motivation on student learning motivation.

Keywords: Teacher Performance; Teacher Work Motivation; Student Learning Motivation.

INTRODUCTION

One factor that becomes a benchmark for educational success in schools is teacher performance and teacher work motivation because teachers determine the success of education in schools. The main task of a teacher is to educate, teach, guide, direct, train, assess and evaluate learners. In addition, a teacher also greatly influences his students because the teacher becomes a role model with norms and religious values that are exemplary to his students. Therefore, teacher performance in the learning process is very influential in the success of the learning process. According to [1], teacher performance is a form of behaviour of a teacher's activity in the learning process, namely how a teacher plans to learn, carries out learning activities and assesses learning outcomes. The author [2] argues that "Performance is influenced by ability and motivation. It goes on to say that abilities are influenced by knowledge and skills. Knowledge is influenced by education, experience, practice and interests. Skills are influenced by talent and personality. Motivation is influenced by factors of the physical environment of the work, the social environment of the work consisting of leadership and organization".

Regulation of the Minister of National Education of the Republic of Indonesia Number 16 of 2007 states four competencies for assessing teacher performance: pedagogical, professional, personality, and social. Author [3] explains the four competencies:

1) Pedagogic competence relates to the teacher's ability to understand learning theory and develop curriculum and students' potential.

2) Personality competence is related to the teacher's actions in line with the corridors of legal, religious, social and cultural norms. In addition, teachers also need to have maturity in thinking and show maturity and responsibility.

3) Social competence includes being objective, inclusive, communicative, and fair by not discriminating.

4) Professional competence includes the ability of teachers to master scientific materials and maps, which have concepts, structures and mindsets.

According to [4], "work motivation is something that every individual needs to achieve the target or thing achieved from the job, where this work motivation makes each enthusiastic or has the drive to influence each individual in work". It is common to find teachers who do not have passion and enthusiasm in carrying out their duties. Various problems influence this faced both from the family, community, and school environment as well as those related to tasks and workloads that are too heavy are often classic reasons that make teachers' low work motivation, this will undoubtedly result in low teacher performance. It is common to find a teacher just carrying out tasks to earn income. So educating is not a call of the heart. He works without passion, initiative, goal, or clear target.

The authors [5] said that a teacher needs the motivation to carry out his duties and responsibilities. A teacher's performance is determined by how motivated he is at work. The teacher needs a lot of inspiration from both within and from the principal, colleagues, family and others. In a school, the principal has a vital role in constantly motivating teachers so that the goals set by the school can be achieved.

The author [6] explained that teachers must be creative to generate student learning motivation so that students have the spirit of learning, can become outstanding students, and can develop themselves optimally.

The author [7] stated several things that teachers can do to encourage children to be motivated to learn, namely: giving praise, paying particular attention, fostering friendship with students, providing understanding, instilling self-confidence, keeping students away from feelings of fear, giving opportunities, and providing motivation.

Learning motivation is one of the internal factors that affect student learning outcomes. This motivation encourages students to carry out learning activities. Students will succeed if there is a will and encouragement in themselves. Good motivation will cause a better enthusiasm for learning. On the contrary, lousy motivation will make students not passionate about the learning process. The author [8] explains that learning motivation is the overall psychic driving force in students that gives rise to a form of learning activity, ensures the continuity of learning activities and provides direction to the learning activity to achieve a goal. Researcher [9] says there are two motivations for learning: intrinsic and extrinsic. Knowledge can come from within the learner, commonly referred to as intrinsic motivation and can also come from outside the learner, called extrinsic motivation. Learning will be fun if there is a willingness to understand the material and complete learning tasks in students. However, not all students are well motivated to receive learning materials. This is what causes learning outcomes to be less than optimal.

METHOD

This research uses a quantitative approach with an associative type. The author [10] explaining quantitative methods can be interpreted as research methods based on the philosophy of positivism, used to research specific populations or samples, data collection using research instruments, and data analysis are quantitative/statistical to test the hypotheses that have been determined. At the same time, associative research is a formulation that asks about the relationship between two or more variables.

The population in this study was all class teachers at Bungoeng Seroja Elementary School (SD) Cluster in Banda Aceh, which amounted to 24 people and 24 students.

The instruments used in this study consisted of observations, questionnaires, and documentation. The questionnaire used a Likert scale with a very positive to negative gradation. Data collection in the study aims to determine teacher performance, teacher work motivation, student learning motivation, the influence of teacher performance on student learning motivation, and the influence of teacher work motivation on student learning motivation.

Normality and Linearity Testing. This test is carried out to determine whether the data analysis for hypothesis testing can be continued. Meanwhile, the data must be expressed as customarily distributed and linear-positioned in simple linear regression and multiple regression analyses. For this reason, it is necessary to test the analysis

prerequisites in the form of normality and linearity testing. The following are the results of the normality test using the SPSS, namely the Kolmogorov-Smirnov and Shapiro-Wilk tests, which can be seen in Table 1.

Table 1 - Normality Test Table

Tests of Normality						
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Work Motivation Teacher	.105	24	.200*	.975	24	.782
Student's Motivation To Study	.106	24	.200*	.979	24	.877
Teacher Performance	.066	24	.200*	.978	24	.865

Notes: *) This is a lower bound of the true significance;
a) Lilliefors Significance Correction

Table 1 shows that the significance value (Sig) of each variable shows a value greater than 0.05, so it can be concluded that the population comes from a normal distribution.

Linearity testing is performed to determine whether free variables (X1), (X2) and bound variables (Y) have a linear relationship. From Table 2, it can be seen that the significance value of the teacher performance variable (X1) and the student learning motivation variable (Y) is more significant than 0.05 (0.702 > 0.05), and the F value of the F <table is 0.745 < 2.44. It can be concluded that the variables X1 and Y have a linear relationship.

From Table 3, it can be seen that the significance value of the teacher work motivation variable (X2) and the student learning motivation variable (Y) is more significant than 0.05 (0.696>0.05), and the F value is calculated < from the F table, which is 0.749 < 2.37, it can be concluded that the variables X2 and Y have a linear relationship.

Table 2 - Linearity Test X1 Against Y

			Sum of Squares	Df	Mean Square	F	Sig.
Motivation Study Student* Teacher Performance	Between Groups	(Combined)	285.500	16	17.844	1.350	.358
		Linearity	137.811	1	137.811 10.429		.014
		Deviation from Linearity	147.689	15	9.846	.745	.702
	Within Groups		92.500	7	13.214		
	Total		378.000	23			

Table 3 - Linearity Test X2 Against Y

			Sum of Squares	Df	Mean Square	F	Sig.
Motivation Study Student* Motivation Teacher's Work	Between Groups	(Combined)	265.667	15	17.711	1.261	.383
		Linearity	118.413	1	118.413	8.433	.020
		Deviation from Linearity	147.254	14	10.518	.749	.696
	Within Groups		112.333	8	14.042		
	Total		378.000	23			

Research Hypothesis Testing. The first hypothesis to be tested in this study is "there is a positive and significant relationship between teacher performance and student motivation". The test uses simple regression analysis with the help of the SPSS version 26 program. The results of the test can be seen in Table 4.

Table 4 - Summary of X1 Regression Analysis Results against Y

Regression Coefficient	R	R^2	t-count	t-table	Sig
a = 33.010 b = 0.445	0.604	0.365	3.553	1.717	0.002

Based on the results of this analysis, the regression line equation can be stated as follows:

Y = a + bX1 = 33,010X1 + 0.445

This equation shows that the value of the regression coefficient is positive by 0.445, which means that if the teacher's performance (X1) increases by one unit, the importance of student motivation (Y) increases by 0.445 or 44.5%.

The result of the correlation coefficient of 0.604 is positive, so teacher performance positively affects student learning motivation. The result of the coefficient of determination is 0.365. This indicates that teacher performance influences student motivation by 36.5%, while other factors influence 63.5%.

The significance test aims to determine the significance of the teacher's performance variable on student learning motivation. Based on the t-test results, the calculated t-value is more significant than the t-table, 3.553 > 1.717, so teacher performance significantly influences student learning motivation.

Based on the description of the results of the simple regression analysis, it can be concluded that "there is a positive and significant relationship between teacher performance and student learning motivation". This shows that the first research hypothesis is accepted.

The second hypothesis to be tested in this study is "there is a positive and significant relationship between teacher work motivation and student motivation." The test uses simple regression analysis with the help of the SPSS. The results of the test can be seen in Table 5.

Table 5 - Summary of X2 Regression Analysis Results against Y

Regression Coefficient	R	R^2	t-count	t-table	Sig
a = 33.810 b = 0.457	0.560	0.313	3.168	1.717	0.004

Based on the results of the analysis, the regression line equation can be expressed as follows:

Y = a + bX2 = 33,810X2 + 0.457

The equation shows that the value of the regression coefficient is positive by 0.457, which means that if the teacher's work motivation (X2) increases by one unit, the student learning motivation value (Y) increases by 0.457 or 45.7%.

The result of the correlation coefficient of 0.560 is positive, so teacher performance positively affects student learning motivation. The coefficient of determination of 0.313 shows that teacher performance influences student learning motivation by 31.3% while other factors influence 68.7%.

Significance testing aims to determine the significance of teacher work motivation variables to student learning motivation. Based on the t-test results, the calculated t-value is more significant than the t-table, 3,168 > 1,717, so teacher performance significantly influenced student learning motivation.

Based on the description of the results of the simple regression analysis, it can be concluded that "there is a positive and significant relationship between teacher work motivation and student learning motivation". This suggests that this second research hypothesis is accepted.

RESULTS AND DISCUSSION

Teacher Performance. In educational competence, the role of this teacher dominates more in the learning aspect. This can be seen in the ability of a teacher to plan teaching and learning programs, the ability to carry out interactions and the ability to conduct assessments. In this educational aspect, the teacher's performance is excellent. This can be seen from the results of research data processing where from the 24 teachers studied. There were 21 teachers with high categories, while the other three teachers were categorized as medium.

In personality competence, teachers, whose main task is to teach, have characteristics that greatly influence the success of human resource development. The steady personality of an educator will set an excellent example for students and the community. Regarding personality competence, teacher performance is in an outstanding category. This can be seen from the data processing of

research results, where from the 24 teachers studied, 22 teachers had high types while the other two were categorized as medium.

In professional competence, a teacher must have a mastery of the learning material broadly and deeply, allowing them to guide students in mastering the material taught. Regarding professional competence, teacher performance is in the high category of 21 teachers, and three teachers are in the medium category.

In social competence, a teacher must have the ability to communicate and associate effectively with students, education staff, parents, and the community. Regarding social competence, teacher performance is in the high category of 18 people, and six people are in the medium category.

This study assessed teacher performance based on these four aspects of competence, which were categorized into high, medium, and low. The results of the categories can be seen in Table 6 below.

Table 6 - Frequency Distribution of Teacher Performance

No	Category	Frequency	Interval	%
1	Height	23	76-100	95,8
2	Currently	1	51-75	4,2
3	Low	0	25-50	0
Amount		24	Amount	100

From Table 6, it is explained that of the 24 teachers of the Bungoeng Seroja Elementary School (SD) Cluster in Banda Aceh City studied, 23 teachers had high performance (95.8%) while one teacher had moderate performance (4.2%).

Teacher Work Motivation. Teacher work motivation is encouraging teachers to act, determining the direction of actions, selecting deeds, and driving teachers to achieve a goal. The teacher's work motivation is assessed through intrinsic motivation and extrinsic motivation.

In intrinsic motivation, teacher work motivation is in the high category. This can be seen from the results of research data processing where from the 24 teachers studied. There were 23 teachers with high types and one teacher with medium categories.

Meanwhile, teacher work motivation is in a high category in extrinsic motivation. This can be seen from the results of research data processing where of the 24 teachers studied, all of them have high types.

This study assessed teacher work motivation based on these two aspects of reason, which were categorized into high, medium, and low. Categories can be seen in table 7.

Table 7 – Frequency Distribution of Teacher Work Motivation

No	Category	Frequency	Interval	%
1	Height	24	70-92	100
2	Currently	0	47-69	0
3	Low	0	2-46	0
Amount		24	Amount	100

From Table 6, it is explained that of the 24 teachers of the Bungoeng Seroja Elementary School (SD) Cluster in Banda Aceh City studied, all of them had high work motivation.

Student Learning Motivation. Learning motivation is the overall driving force from within and outside the student, thus causing desire, desire, enthusiasm and passion in learning activities. Students learning motivation is assessed through intrinsic motivation and extrinsic motivation.

On intrinsic motivation influenced by the student's desire to achieve a specific goal, for example, excelling, the drive that comes from within the student will provide tremendous power to make them persistent in learning. In the aspect of intrinsic motivation, student learning motivation is in a high category. This can be seen from the results of research data processing where from the 24 students studied, the overall type is high.

While extrinsic motivation is influenced by the student who encourages him to carry out learning activities, this form of extrinsic motivation is an impulse that is not related to learning activities. For example, students study diligently to obtain gifts promised by their parents, praise and gifts, and rules or regulations at school. Regarding extrinsic motivation, student learning motivation is in a high category. This can be seen from the research data processing results where all 24 students studied were in high categories.

In this study, student learning motivation was assessed based on these two aspects of reason, which were categorized into three categories high, medium, and low. The results of the categories can be seen in Table 8.

Table 8 – Distribution of Student Learning Motivation Frequency

No	Category	Frequency	Interval	%
1	Height	24	61-80	100
2	Currently	0	41-60	0
3	Low	0	20-40	0
Amount		24	Amount	100 %

The table explains that of the 24 students of Bungoeng Seroja Elementary School (SD) Cluster in Banda Aceh studied, all had high learning motivation.

The Effect of Teacher Performance on Student Learning Motivation. The results of this study show that teacher performance has a positive and significant effect on student learning motivation. This is evidenced by the value of a simple regression analysis with a correlation coefficient of 0.604 and a coefficient of determination of 0.365, so the correlation is positive. The t-value of the table > t is 3,553 > 1,717, so there is a significant influence between teacher performance on student learning motivation. Teacher performance influences student learning motivation by 36.5%, while other factors affect an additional 63.5%. A summary of the calculation results of regression analysis can be seen in Table 9.

Table 9 - Summary of X1 Regression Analysis Results Against Y

Regression Coefficient	R	R^2	t-count	t-table	Sig
a = 33.010 b = 0.445	0.604	0.365	3.553	1.717	0.002

The Effect of Teacher Work Motivation on Student Learning Motivation. The results of this study show that teacher work motivation has a positive and significant effect on student learning motivation. This is evidenced by the value of a simple regression analysis with a correlation coefficient of 0.560 and a coefficient of determination of 0.313, so it can be said that the correlation is positive. The value of t count > t table is 3.168 > 1.717, so there is a significant influence between teacher work motivation and student learning motivation. Teacher work motivation influences student learning motivation by 31.3%, while other factors affect an additional 68.7%. A summary of the calculation results of regression analysis can be seen in Table 10.

Table 10 - Summary of X2 Regression Analysis Results against Y

Regression Coefficient	R	R^2	T count	T table	Sig
a = 33,810 b = 0.457	0,560	0,313	3,168	1,717	0,004

CONCLUSIONS

Based on the results and discussion of the study, the following conclusions can be drawn:

1. Teachers' performance is assessed on pedagogical, personal, professional, and social competence. Explained that of the 24 teachers studied, 23 teachers had high performance or 95.8% and one teacher with moderate performance or 4.2%.

2. Teachers' work motivation is assessed from intrinsic and extrinsic motivation. Explained that all 24 teachers studied had high or 100% work motivation.

3. Students learning motivation is assessed from the aspects of intrinsic and extrinsic motivation. Explained that all 24 students studied had high or 100% learning motivation.

4. There is a positive and significant influence between teacher performance on student learning motivation. Teacher performance affects student learning motivation by 36.5%.

5. A significant positive influence exists between teacher work motivation and student learning motivation. Teacher work motivation affects student learning motivation by 31.3%.

ACKNOWLEDGMENTS

Thank you to the principal, teachers, and students at Gugus Bungoeng Seroja Elementary School Banda Aceh for providing research opportunities. Thank you to the supervisor who has guided me in completing this article.

REFERENCES

1. Hafidulloh., Sofiah, N. I., & Mochamad, M. (2021). *Manajemen Guru: Meningkatkan Disiplin dan Kinerja Guru* [Teacher Management: Improving Teacher Discipline and Performance]. Yogyakarta: Bintang Pustaka Madani (in Indonesian).
2. Madjid, A. (2016). *Pengembangan Kinerja Guru Melalui Kompetensi, Komitmen dan Motivasi Kerja* [Teacher Performance Development through Competence, Commitment and Work Motivation]. Yogyakarta: Samudra Biru (in Indonesian).
3. Sudibjo, N., Edberg, W. (2021). Kinerja Guru dan Faktor-Faktor yang Mempengaruhinya [Teacher Performance and its Influencing Factors]. *The Asia Pacific of Management Studies, 8*(2), 59–70 (in Indonesian).
4. Adhari, L. Z. (2021). Optimalisasi Kinerja Karyawan Menggunakan Pendekatan Knowledge Management & Motivasi Kerja [Optimising Employee Performance Using a Knowledge Management & Work Motivation Approach]. Pasuruan: Qiara Media (in Indonesian).
5. Amalda, N., & Prasojo, L. D. (2018). Pengaruh motivasi kerja guru, disiplin kerja guru, dan kedisiplinan siswa terhadap prestasi belajar siswa [The effect of teacher work motivation, teacher work discipline, and student discipline on student learning achievement]. *Jurnal Akuntabilitas Manajemen Pendidikan, 6*(1), 11. doi: 10.21831/amp.v6i1.7515 (in Indonesian).
6. Arianti, A. (2019). Peranan Guru Dalam Meningkatkan Motivasi Belajar Siswa [The Role of Teachers in Increasing Student Motivation]. *Didaktika, 12*(2), 117–134. doi: 10.30863/didaktika.v12i2.181 (in Indonesian).
7. Hidayah, N., Hardika., & Gunawan, I. (Eds.). (2017). *Psikologi Pendidikan* [Educational Psychology]. Malang: Universitas Negeri Malang (in Indonesian).
8. Asrori. (2020). *Psikologi Pendidikan Pendekatan Multidisipliner* [Educational Psychology A Multidisciplinary Approach]. Banyumas: Pena Persada (in Indonesian).
9. Suralaga, F. (2021). *Psikologi Pendidikan. Implikasi dalam Pembelajaran* [Educational Psychology. Implications for Learning]. Depok: King Grafindo Persada (in Indonesian).
10. Sugiyono. (2014). *Metode Penelitian kuantitatif, kualitatif dan R&D* [Quantitative, Qualitative and R&D Research Methods]. Bandung: Alfabeta (in Indonesian).
11. Husnu, A. (Ed.). (2020). *Metode Penelitian Kualitatif dan Kuantitatif* [Qualitative and Quantitative Research Methods]. Yogyakarta: Pustaka Ilmu (in Indonesian).

Implementation of Teacher Working Group Training Program Using the Blended Learning Model in Cluster 1 Krueng Sabee, Aceh Jaya District, Indonesia

Mardiana [1], **Nasir Usman** [1], **Khairuddin** [1]

[1] *Syiah Kuala University*
Jln. Teuku Nyak Arief, Darussalam, Banda Aceh, Aceh, 23111, Indonesia

DOI: 10.22178/pos.89-11

LCC Subject Category: L7-991

Received 21.12.2022
Accepted 27.01.2023
Published online 31.01.2023

Corresponding Author:
Mardiana
hamidi@unram.ac.id

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. This study aimed to get an overview of the implementation of the KKG training program using the blended learning model in cluster 1 Krueng Sabee, Aceh Jaya Regency. This study used a qualitative approach with a descriptive research type. Data collection techniques using observation, interviews, and documentation. The research results show that: 1) Using a blended learning model, Teacher Working Group training programs include general, core and supporting schedules. 2)The strategy for implementing the Teacher Working Group training program uses a blended learning model, face-to-face and virtually via zoom meetings. 3) Coaches evaluate the Teacher Working Group training program, heads, PKG heads and school principals. This evaluation is carried out every month to determine the obstacles in implementing educational programs, especially the Teacher Working Group training program. This evaluation is done through questionnaires/instruments, observation or direct interviews. 4) Obstacles in implementing the Teacher Working Group training program are due to lack of funding assistance, lack of enthusiasm and motivation from teachers in developing their abilities, and lack of understanding of some teachers regarding the use of computer technology and the applications used in blended learning models.

Keywords: Program; Teacher Working Group Training; Blended Learning.

INTRODUCTION

Educational development is a topic that is always discussed from time to time because education has the task of preparing human resources for development in line with the demands of the times [1]. Therefore, in implementing the education process, the government and educational institutions always strive to provide quality education services to produce quality graduates relevant to the development and changing times [2]. Education and nation-building are a very strategic spectrum [3]. In various developed countries, the position of education for the successful development of a nation is the leading position. This means that handling education (with all its consequences, especially the concentration of thoughts and budgets) can ensure the nation's development in the right direction.

The education system has components of goals, students, educators, educational tools, materials, methods/interactions, media, and evaluation [4]. The consistency of the essence of education in all components of the education system is highly dependent on educators and personnel responsible for implementing, managing and implementing education [5, 6]. Education personnel must support so that the role of educators can be influential as trainers, teachers as well as educators. This education personnel also includes all organisers starting from the level of the ranks of departments, provincial offices, and city district offices to sub-district office branches.

The first teacher competence is personality competence. Personality competence is a personal ability that can reflect the personality of someone who is mature, wise and authoritative, steady, stable, noble, and can be a good role model for students [7, 8, 9, 10].

Pedagogical competence is the ability of a teacher to understand students, design and implement learning, develop students, and evaluate student learning outcomes to actualise their potential [11, 12].

Social competence is the ability possessed by a teacher to communicate and get along with education personnel, students, parents of students, and the community around the school [7].

Professional competence is the mastery of learning materials with more breadth and depth. Includes knowledge of the subject curriculum material and the substance of the science that overshadows the learning material and masters the scientific structure and methodology [8].

Professional teachers can educate their students to become generations who can compete and have good morals. An educator should have good behaviour that can be a role model for students. Teacher professionalism is essential for educators to carry out their duties correctly [13]. One component that determines the success or failure of education implementation is the teacher [14]. As the spearhead of education who are directly on the front line dealing with students, teachers must have adequate competence. Through teachers, values and learning of various knowledge, experiences and skills relevant to the present and future can occur. The ideal teacher must receive continuous training as long as the teacher's professional ability has yet to reach the level.

In this era of globalisation, all knowledge is quickly obsolete. Especially if teachers need to be trained and need access to new information, and if that happens, teachers will be left behind. So there is no doubt that to achieve good quality education, teachers must constantly be upgraded so that teachers are always fresh in information, strong in work ethic, and intelligent in mind. The author [15] argues that the Teacher Working Group at school can improve teachers' abilities in managing the teaching and learning process and overcoming problems faced with their duties as educators. The Teacher Working Group is a community/professional activity group for SD/MI teachers still in one cluster/district. In principle, it is almost the same as MGMP (Musyawarah Guru Mata Pelajaran) [16]. However, if MGMP is a group of junior high school/high school/vocational school subject teachers in one district, then the teachers' working group is a group of classroom teachers in one sub-district. The groups are divided into three: class teachers' working groups, religious education teachers' working groups and physical education teachers' working groups. This is expected to be a forum to improve teachers' competence and skills inside and outside the classroom.

As an educator, teachers must have competence and expertise by applicable laws and regulations. Law of the Republic of Indonesia Number 14 of 2005 states that to carry out their professional duties, teachers must improve and develop their academic qualifications and competencies on an ongoing basis in line with the development of science, technology and art. The above law shows that educators must have superior quality to produce excellent generations. The quality of their competence determines the quality of educators. Therefore, educators/teachers must have their forum to improve their professional work. Possible platforms are the KKG for primary school teachers, the MGMP for subject teachers at junior and senior high school levels, and the KKKS/MKKS for school principals.

The concept of teacher training will change from a seminar or workshop model to more practical training. A curriculum that is easy to understand and more flexible is also needed to support the implementation of independent learning. The author [17] suggests a curriculum that can encourage teachers to choose high-quality learning materials or methods, but according to the level of competence, interests and talents of each. Furthermore, the author [18] states that blended learning-based learning is learning that combines learning delivery strategies using face-to-face activities and computer-based learning (offline) and online computers (internet and mobile learning).

The Ministry of Education and Culture has also issued a programme that all teachers must follow to develop their competencies, namely the Management Information System for Continuing Professional Development (SIMPKB). All teachers recorded in Dapodik can join this programme to improve their competence anytime, anywhere and with anyone.

In response to this, educational institutions under the auspices of KKG Gugus 1 Krueng Sabee Aceh Jaya District, which consists of 5 Primary Education Units including; SD Negeri 1 Calang, SD Negeri 2 Calang, SD Negeri 3 Calang, SD Negeri 4 Calang and SD Negeri 4 Krueng Sabe, immediately prepared and adjusted the situation by training and guiding teachers with blended learning methods to improve teacher competence so that they become more skilled and professional in responding to all obstacles and ob-

stacles in learning which are increasingly diverse and complex and to improve the quality of education according to the demands of the current reform era 4.0.

METHOD

The research approach used a qualitative approach with a descriptive research type. The subjects in this study were 1 PKG chairperson, 5 KKG core administrators, one supervisor, five principals, 50 teachers and 35 students from education units under the KKG Gugus 1 Krueng Sabee in Aceh Jaya district. Thus, the total number of research subjects was 97.

The determination of the research subjects above was based on several considerations, including PKG leaders, teachers' working group administrators, supervisors, principals, teachers and students are essential elements in the education unit concerning planning, implementation, supervision and evaluation to improve the effectiveness and quality of education in the education unit under the auspices of the Krueng Sabee cluster 1 teachers' working group in Aceh Jaya district. In contrast, teachers' working group administrators are the primary data source for this research.

In this study, the instruments used to collect data on the implementation of academic supervision and teacher performance appraisal were observation guidelines, interview guidelines and documentation studies. The data analysis technique used was qualitative descriptive analysis, while the data processing steps were data reduction, data display, conclusions, and data verification.

RESULTS AND DISCUSSION

The KKG training programme using the blended learning model in cluster 1 Krueng Sabee, Aceh Jaya district

Based on the findings in the field, researchers found that the teachers' working group is a professional forum for teachers in school clusters, sub-districts and at the district/city level and plays an essential and strategic role in improving teacher competence so that teachers are more professional.

The indicators of the success of the teachers' working group include:

1. The quality of learning services has improved (this improvement is characterised by learning that is more educational, enjoyable and meaningful for students).

2. Teacher members can exchange experiences, resulting in feedback between members.

3. Teachers' knowledge, skills, attitudes and performance improve. This can be seen in the way teachers teach in the classroom.

It is necessary to have a clear and structured KKG programme to support implementing a good, effective and efficient KKG training programme. The KKG work programme is the same as the MGMP work programme. The basis for forming the work programme is the four essential teacher competencies: academic, professional, social and personality. The KKG training programmes that researchers found in Cluster 1 Krueng Sabee in Aceh Jaya district are as follows:

General programme. The programme contains insights given to teachers regarding education policy (teacher professional development policy) at the local to the main level.

Core programme. This is the main programme that is needed to improve teacher competence. The core programme can be divided into routine and development programmes. Routine programmes include the following activities: 1) Discussion of various problems in learning; 2) Drafting and developing a syllabus and lesson plans; 3) Analysing the curriculum; 4) Preparing reports on student learning outcomes; 5) Material deepening activities; 6) Training to support teaching tasks, for example, making learning media for counting, memorising, etc. 7) Discussing material to face school exams.

Meanwhile, the development programme, which is a forum for developing sustainable professionalism, has the following development programmes: 1) Research, for example, classroom action research; 2) Writing scientific papers on current issues; 3) Seminars, workshops, colloquiums and panel discussions; 4) Tiered training, including education and training; 5) Teacher performance competitions; 6) Assistance in carrying out teacher duties by tutors/facilitators/mentors provided by the teachers' working group; 7) Assessment of learning practices containing three components: plan, do, see; 8) Organising professional learning communities; 9) Organising international teacher professional development.

Support programme. Supporting programmes are KKG work programmes that aim to broaden the

knowledge and skills of its members. The supporting programme that researchers found in Krueng Sabee cluster 1 was information and technology training.

With a clear and structured programme, it is expected that it will be easier to realise the objectives of the KKG training programme, especially using the blended learning model. The KKG programme can facilitate efforts to improve the quality of knowledge, insights, abilities and professional skills of education personnel, especially for primary school teachers, in improving the quality of teaching and learning activities or processes and utilising all the resources and potential of the school, which in turn can improve the quality of learning.

Implementation strategies for the teachers' working group training programme using the blended learning model in cluster 1 Krueng Sabee, Aceh Jaya district

The teachers' working groups in Krueng Sabee cluster 1 have a more remarkable ability to develop the programme by using the opportunities they have to ensure that the competence and professionalism of teachers as members of the teachers' working groups are improved. The strategy that can be applied is to use of blended learning. Using blended learning will facilitate KKG meetings without the time and place constraints. It can also increase teachers' knowledge of computer technology and make it one of the learning media.

Blended learning is also expected to provide variations in structuring the programme into a more structured general, routine, and development programme. In addition, it can also add programmes that aim to provide insight to teachers about education policy, as well as supporting programmes. This can be done by empowering each member in the program's preparation so that the scheduled activities can be known and by socialising the program to all members. Furthermore, a strategy that can be adopted is to programme the implementation of teachers' working groups not only once a month. KKGs can be conducted virtually or face-to-face twice a month to solve problems in the field in a more intense KKG forum.

In implementing blended learning, especially its online learning facilities, teachers can utilise various learning system services or software applications for administration, documentation, tracking, reporting and delivery of education courses or training programmes. The software that can be used includes Zoom Meeting, Moodle, Canvas, Google Classroom, Edmodo, Rumah Belajar digital classroom, blogs and others. Teachers can utilise these services for free or for a fee. Learning and using them to facilitate online learning is just a matter of education. Teachers can maximise online training/learning in blended learning to enable everyone to learn more independently, not bound by time and place, anytime and anywhere according to their ability, and this can be a solution to the limited time that is often a complaint of some teachers in achieving learning objectives.

In the end, the innovative learning model with blended learning can be an alternative that can be implemented by teachers in training/learning and can be independent in education because, with blended learning, in addition to learning face-to-face as usual, learning can also be done online and independently, freely looking for sources of material and information to complete class assignments, alone using gadgets as media and learning resources according to the tendency of millennial children who prefer to learn with gadgets. Teachers/students can freely determine their schedule when accessing online classes and where they will access them. KKG activities in cluster 1 in Krueng Sabee sub-district are also carried out using a model of empowering peer tutors through discussion, the practice of teaching examples, and demonstration of the use and making of teaching aids. This is done so that the KKG activities can occur effectively, efficiently and democratically and optimise teacher professionalism.

Evaluation of the KKG training programme using the blended learning model in cluster 1 Krueng Sabee, Aceh Jaya district

Evaluation is part of the planning, organisation, implementation, monitoring and evaluation management system. With evaluation, it will be known how the evaluation object is in its design, performance and results.

Training programme evaluation is a holistic evaluation used to assess a training programme's effectiveness and efficiency. There are two training programme evaluation types: formative and summative. Formative evaluation is used to col-

lect data and information that will be used to improve the training programme's quality. Data and information from formative evaluations are related to the training programme's deficiencies. Meanwhile, summative tests are used to obtain data and valuable information for making decisions about the sustainability of a training programme. Formative evaluation is conducted during the training programme, whereas summative evaluation is conducted at the end of the training programme.

Thus, training programme evaluation is carried out not only to determine the effectiveness and efficiency of training delivery but also to obtain information related to existing shortcomings so that later the training programme can be improved and a decision made on whether it can be continued. Training programme evaluation can also be used to determine the impact of training programmes on improving employee performance.

The implementation of training programme evaluation is a gradual process with various steps that need to be taken to achieve the evaluation objectives. Such as the steps that need to be taken by the evaluator proposed by [19], among others, are:

1) Determine the focus of the evaluation. Evaluators need to determine what components of the training programme should be evaluated. This needs to be done so that the implementation of the review is more focused and by the predetermined evaluation objectives;

2) Determining respondents. Respondents are the primary source of data and information that will be processed. Respondents can come from participants, teaching staff or coaching staff;

3) Determining data collection methods/instruments. There are various methods to collect the necessary data and information, such as surveys, observations, interviews or document analyses, and multiple data collection instruments, such as checklists, rating scales, or interview guides. The selection and use of appropriate methods and tools will help in obtaining accurate and comprehensive data;

4) Collecting and analysing data. The collection of data and information needs to be systematic and objective to avoid "bias" in decision-making. The data and information that have been collected are then analysed either qualitatively or quantitatively. Data triangulation can be used in analysing the collected data, which will help the evaluator in making recommendations as the final result of the evaluation;

5) Preparing an evaluation report. The report is prepared based on the data analysis that has been carried out. The notice must be prepared in a systematic, complete form and easily understood by the reader of the information.

The evaluation results in the form of recommendations should be expressed in a thorough, logical and comprehensive manner so that they can be used as a consideration in decision-making related to the improvement and sustainability of the training programme. By following these steps, the evaluation of training programmes can be carried out optimally. The training programme can be improved if there are deficiencies and can be changed if not by the needs and development of employees' work needs or agencies. This can be done by developing a clear, detailed and realistic monitoring and evaluation plan as a guideline for internal monitoring and evaluation; establishing cooperation with competent parties as facilitators in monitoring and evaluation.

In addition, an evaluation can also be carried out after an activity programme is implemented.

This evaluation aims to:

1) Develop a clear, detailed and realistic monitoring and evaluation plan as a guideline for conducting internal monitoring and evaluation;

2) Establish cooperation with competent parties as facilitators in monitoring and evaluation so that they can provide input for improvement for future activities.

In addition, there are several evaluation objectives, namely:

1) To obtain a basis for considering at the end of a period of work, in this case, the KKG training programme, what has been achieved, what has not been achieved and what needs particular attention,

2) To ensure an effective and efficient way of working (the teachers' working group training program) that leads the organisation to use its resources efficiently and economically,

3) To obtain facts about difficulties, obstacles and deviations in certain aspects to improve the professionalism of teachers/educators.

Implementing the KKG training programme using the blended learning model in cluster 1 Krueng Sabee, Aceh Jaya district faced constraints.

Implementing education today, which uses an independent curriculum, certainly demands the quality of teacher resources. The task of teachers is to develop scientific insights and shape students' attitudes, values and personality maturity. In this context, a teacher needs to be given the freedom to create the abilities of his students through understanding, activeness, and learning according to the times by developing life skills so that students have an attitude of independence, adaptive, cooperative and competitive behaviour in facing the challenges and demands of everyday life.

A teacher must be able to carry out their duties professionally in developing learning that is interactive, dialogical, interesting, practical and fun for students. When connected with the current conditions in the field, talking about teacher competence and professionalism is still faced with many problems.

Several teacher problems include [15]:

1) teachers are not ready to implement learning innovations; they tend to return to conventional learning patterns;

2) teacher qualification and certification improvement programmes have no direct impact on improving student achievement;

3) continuous professional development programmes are not seen as strategic programmes that have added value to the enrichment of teachers' insights and skills;

4) Teachers are involved in practical politics in direct elections, which affect their performance in learning and relationships with peers;

5) Teachers are trapped in a bureaucratic mindset in implementing the curriculum and;

6) The encouragement and willingness to learn and develop themselves have yet to be prioritised by teachers who have been certified.

Of the four competencies that teachers must have, two of them are considered to be severe and significant problems among teachers, namely academic competence and professional competence. From pedagogical competence, for example, teachers are deemed unable to manage to learn optimally in terms of understanding students, designing and implementing learning, evaluating learning outcomes, and developing students to actualise their various potentials.

From the aspect of professional competence, many teachers are still considered stuttering in mastering the teaching material broadly and deeply, thus failing to present meaningful and valuable learning activities for students. This is further emphasised when referring to the Regulation of the Minister of Education of the Republic of Indonesia Number 16 of 2007 on Academic Standards and Competencies, the low mastery of pedagogic competence reveals that teachers are not sufficiently competent in the following subcompetencies:

1) Mastering the characteristics of students from physical, moral, social, cultural, emotional and intellectual aspects;

2) Mastering learning theories and principles of educational learning;

3) Developing curriculum related to the subjects/fields taught;

4) Organising educational learning;

5) Utilising information and communication technology for learning purposes;

6) Facilitating the development of students' potential to actualise their various potentials;

7) Communicating effectively, empathetically and politely with students;

8) Carrying out assessment and evaluation of learning processes and outcomes;

9) Utilising the results of assessment and evaluation for the benefit of learning;

10) Taking reflective action to improve the quality of learning.

Another obstacle is the different educational qualifications of KKG members in Gugus 1 Krueng Sabee. This affects the time allotted for completing the material because each member understands the material differently. Solutions to these problems can be found by:

1) Increasing the role of MGMP and KKG and encouraging teachers to be actively involved in various MGMP and KKG activities or other training activities; 2) Encouraging teachers' professional organisations to pay attention to and fight for the fate of teachers, including in terms of teacher transfers and distribution; 3) Increasing the role of KKG as a forum for teachers to share

knowledge and skills; 4) Creating teacher journals; 5) Providing teacher libraries.

The government facilitates and provides research funds or incentives for creative and active teachers in writing scientific papers or conducting PTK, as well as holding regular scientific writing competitions for teachers.

CONCLUSIONS

Based on the research results, it can be concluded that:

1. The KKG training programme using the blended learning model in Krueng Sabee cluster 1 includes a general, core, and supporting programme.

2. The strategy for implementing the KKG training programme using the blended learning model in Krueng Sabee cluster 1 is carried out using blended learning, which will facilitate KKG meetings without being constrained by time and place. Besides that, it can also broaden teachers' knowledge of computer technology and make it a learning medium. The strategy that can be taken is to programme the implementation of KKG not only once a month. The teachers' working groups can be held virtually or face-to-face twice a month to solve problems in the field in a more intense forum.

The method used to evaluate the teachers' working group training programme in Krueng Sabee cluster 1 is through a questionnaire/instrument that has been prepared or through direct observation or interviews of the teachers' working group training programme results using the blended learning model. The teachers' working group training programme is evaluated by the head of the teachers' working group, the principal and all the teachers involved. The evaluation is carried out monthly to identify any obstacles or barriers to implementing educational programmes, especially the teachers' working group training programme.

The obstacles faced in implementing the teachers' working group training programme include: From the aspect of professional competence, many teachers still need to improve in mastering the teaching material broadly and deeply, so they fail to present meaningful and valuable learning activities for students. There is also a lack of enthusiasm and motivation among teachers to develop their skills, a lack of understanding among some teachers of using computer technology and applications in blended learning models and a lack of funding for teachers' working group activities.

Acknowledgements

Thank you to the head of PKG and the management of KKG Gugus 1 Krueng Sabee, Aceh Jaya district, for helping and giving permission to provide research data.

REFERENCES

1. Ismail. (2015). Pengembangan Kualitas Manajemen Pendidikan [Developing the Quality of Education Management]. *ITTIHAD: Jurnal Kopertais XI Kalimantan, 13*(24), 44–57) (in Indonesian).

2. Indriyanto, B. (2012). Dimensi Pembangunan Karakter dan Strategi Pendidikan [Dimensions of Character Development and Education Strategies]. *Jurnal Pendidikan Dan Kebudayaan, 18*(1), 21–33. doi: 10.24832/jpnk.v18i1.66 (in Indonesian).

3. Mawati, A., Permadi, Y., Rasinus, R., Simarmata, J., Chamidah, D., Saputro, A., Purba, B., Ritonga, M., Sudono, E., Purba, B., Karwanto., & Prasetya, A. (2020). *Inovasi Pendidikan: Konsep, Proses dan Strategi* [Educational Innovation: Concepts, Processes and Strategies]. N. d.: Yayasan Kita Menulis (in Indonesian).

4. Ilham, D. (2019). Menggagas pendidikan nilai dalam sistem pendidikan nasional [Initiating value education in the national education system]. *Didaktika: Jurnal Kependidikan, 8*(3), 109–122 (in Indonesian).

5. Ananda, R. (2018). *Profesi Pendidikan dan Tenaga Kependidikan* [Education Professions and Education Personnel]. N. d: Lembaga Peduli Pengembangan Pendidikan Indonesia (in Indonesian).

6. Tolchah, M. (2016). Pemahaman Pendidik dan Tenaga Kependidikan tentang Pendidikan Umum dengan Kekhasan Agama Islam di MAN 3 Malang [Educators and Education Personnel's Understanding of General Education with Islamic Specialities at MAN 3 Malang]. *ISLAMICA: Jurnal Studi Keislaman, 9*(2), 373. doi: 10.15642/islamica.2015.9.2.373-401 (in Indonesian).

7. Djamarah, S. B. (2005). *Prestasi Belajar dan Kompetensi Guru* [Learning Achievement and Teacher Competence]. N. d.: Rineka Cipta (in Indonesian).

8. Helmi, J. (2015). Kompetensi Profesionalisme Guru [Teacher Professionalism Competence]. *Jurnal Pendidikan*, *7*(2), 319–336 (in Indonesian).

9. Nurhaidah. (2014). Pengembangan Kompetensi Guru Dalam Mewujudkan Sumber Daya Manusia Yang Berkualitas Di Sekolah Dasar [Teacher Competency Development in Realising Quality Human Resources in Primary Schools]. *Jurnal Pesona Dasar*, *2*(3), 13–26 (in Indonesian).

10. Siregar, Y. (2013). Kompetensi Guru Dalam Bidang Strategi Perencanaan Dan Pembelajaran Matematika [Teacher Competence in Strategic Planning and Learning for Mathematics]. *Jurnal Formatif*, *3*(1), 39–48 (in Indonesian).

11. Nurhikmah, I., Widyasari, W., & Sya, M. F. (2019). Peran Kelompok Kerja Guru (Kkg) Dalam Meningkatkan Kompetensi Pedagogik Guru [The Role of Teacher Working Groups (Kkg) in Improving Teachers' Pedagogic Competence]. *Al-Kaaf: Jurnal Riset Kajian Kependidikan Dan Ekonomi Islam*, *2*(2) (in Indonesian).

12. Tyagita, B. P. A., & Iriani, A. (2018). Strategi Peningkatan Kompetensi Pedagogik Guru Untuk Meningkatkan Mutu Sekolah [Strategies to Improve Teachers' Pedagogical Competence to Improve School Quality]. *Kelola: Jurnal Manajemen Pendidikan, 5*(2), 165–176. doi: 10.24246/j.jk.2018.v5.i2.p165-176 (in Indonesian).

13. Noorjannah, L. (2014). Pengembangan Profesionalisme Guru Melalui Penulisan Karya Tulis Ilmiah Bagi Guru Profesional Di Sma Negeri 1 Kauman Kabupaten Tulungagung [Teacher Professionalism Development Through Writing Scientific Papers For Teachers In Professional SMA Negeri 1 Kauman District Tulungagung]. *Jurnal Humanity*, *10*(1), 97–114 (in Indonesian).

14. Rahma Nanda, D. (2019). *Meningkatkan Mutu Dan Profesionalisme Guru*. Doi: 10.31227/osf.io/myx2h (in Indonesian).

15. Azis, A. A. (2021). Efektivitas dan Efisiensi Kegiatan Kelompok Kerja Guru Pendidikan Agama Islam Sekolah Dasar (KKG PAI SD) dalam Meningkatkan Profesionalitas Guru di Kecamatan Ngawen Kabupaten Blora [Effectiveness and Efficiency of Working Group Activities for Elementary School Islamic Religious Education Teachers (KKG PAI SD) in Improving Teacher Professionalism in Ngawen Sub-district, Blora Regency]. *Jurnal Studi Islam dan Sosial*, 2(1), 111–118 (in Indonesian).

16. Idawati, K. (2019). Peningkatan Kinerja Guru Melalui Kompetensi Profesional Dan Kelompok Kerja Guru (KKG) Sekolah Dasar Negeri Gugus III Kecamatan Gunung Agung Tulang Bawang Barat [Improving Teacher Performance Through Professional Competence and Teacher Working Groups (KKG) at State Primary Schools in Gugus III Gunung Agung Sub-district, West Tulang Bawang District]. *Jurnal Lentera Pendidikan Pusat Penelitian LPPM UM METRO*, *4*(2), 46–57 (in Indonesian).

17. Sudarma, M. (2021). *Merdeka Belajar – Menjadi Manusia Autentik* [Freedom to Learn - Becoming an Authentic Human]. Jakarta: Alex Media Komputindo (in Indonesian).

18. Wasis, D. (2018). *Pembelajaran Berbasis Blended Learning* [Blended Learning]. Depok: Raja Grafindo Persada (in Indonesian).

19. Pribadi, B. (2019). *Model Desain Sistem Pembelajaran* [Learning System Design Model]. Jakarta: Dian (in Indonesian).

Effectiveness of Internet Accessibility on Academic Activities of Open and Distant Learners in the National Open University of Nigeria

Chimezie Prince Ochionuoha [1]

[1] *University of Lagos*
101017 University Road, Akoka, Lagos State, Nigeria

DOI: 10.22178/pos.89-22

LCC Subject Category: L7-991

Received 20.12.2022
Accepted 28.01.2023
Published online 31.01.2023

Corresponding Author:
princeconcord24@gmail.com

© 2023 The Author. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. This study investigated the effectiveness of internet accessibility on academic activities of open and distant learners of the National Open University of Nigeria, Lagos State. Technological Determinism Theory and Media Dependency Theory provided the framework for the study. A survey method was adopted, and a questionnaire comprising closed-ended and open-ended questions was used to collect data. It used a simple random sampling method in choosing the sample. One hundred twenty copies of the questionnaire were administered to the respondents during the study. Findings from the data analysed show that most students have access to the internet mainly on their mobile phones with self-sponsored mobile data. They face difficulties accessing the internet, which interferes with their academic activities. The study recommended that the National Open University of Nigeria should improve its network service to give the students seamless access to the school's online platforms and provide some offline options for the learners as alternatives to guard against any unexpected failure of the online options. The offline options will also carry along the older and less tech-savvy learners until they adapt to the online school system. The work concluded that poor internet accessibility significantly affects academic activities in open and distance learning. Consequently, access to the internet should be improved.

Keywords: Internet accessibility; open and distance Learning; National Open University of Nigeria; distant learners.

INTRODUCTION

Conventional universities have yet to meet the educational needs of people due to the high number of people that apply for admissions every year. As a result, most applicants to these conventional universities do not eventually get admitted to pursue their academic endeavours. This situation has created a sizeable educational gap in the system as more people interested in acquiring knowledge and skills offered in educational institutions are denied the opportunity. This implies that the demand for educational opportunities to study far outweighs the chances to do so as provided by conventional universities and other customary institutions of Higher Learning.

In addition to the above, the difficulties involved in meeting admission requirements, and the strict rules and methods of operation of these conventional universities, among other factors, have made it difficult, if not impossible, for them to accommodate the different categories of learners who want to acquire knowledge. This gave rise to alternative means of meeting these other categories of learners that conventional universities could not cater for. These factors make Open and Distance Learning (ODL) an excellent alternative to fill this educational gap because ODL meets those needs that conventional universities cannot meet for many learners who could not secure admission or who have particular issues that they cannot run their academic programs in traditional universities.

Author [1] notes that Open and Distance Learning is a fast-developing aspect of learning that have been more influential by the emergence of internet-based devices, especially the web. Similarly, [2] refers to Open and Distance Learning as the type where teachers and learners are kept

apart by time and distance while different media are used to deliver lessons in interactive ways. However, students and teachers may meet rarely. The avenues for obtaining and sharing information and knowledge offered by the internet are numerous and more than one can think of. The internet brings a lot of personalised experiences and flexibility than has been experienced before. The internet, which is the hub of almost all online technologies, is very important in ODL because all the online media used for academic activities in the ODL setting create, organise and share content; interact with others and do other educational activities online. Depend primarily on having access to the internet.

According to [3], the internet has facilitated academic activities in higher institutions in Nigeria for many years. In the ODL, the instructors are separated from their students by distance, space and time, and to fill the vacuum, technological devices are used to share information and interact. Most of these technological devices depend on the internet. The need for communication, sharing of messages, and exchange arises among teachers and students and the students themselves in their academic pursuits. In agreement with the above, [4] submit that the internet is essential in many ways, including teaching, research and learning in educational institutions. The internet heralded a new means of creating and sharing knowledge in a mild form.

Statement of the Problem

Most of the academic work students do during their academic pursuit in ODL is online-based, with internet-enabled technologies dominating the whole process. This entails that any challenge in internet accessibility, especially when it is not the fault of the leaner(s), may have an effect on the student's academic activities since the Distant Learners will depend on the internet throughout their academic programme in ODL.

Given the above, there is a need to establish the effect of internet access on the academic activities of ODL students at NOUN, which is in Nigeria – a developing country in sub-Saharan Africa still struggling with some infrastructural facilities and other technologies. Being that NOUN is the only fully ODL institution in the country, it will be good to establish the effect of internet accessibility in academic activities in the institution to know where things are good and where to make amendments to improve the learning experience in the school. This study comes in handy as an academic contribution to knowledge, an empirical approach to the issues of internet accessibility in ODL, and to provide literature that can be useful for other studies.

The essence of this study is to ascertain the effect of internet access on the academic activities of ODL students at NOUN. But the specific objectives of this research are:

1. To identify the various means through which the students can access the internet.

2. To identify the academic activities, they carry out on the internet.

3. To ascertain the challenges they experience in accessing the internet in educational activities.

4. To determine how internet accessibility affects their academic activities.

5. To assess the difference in male and female views of internet accessibility.

Research Questions

1. What are the means through which the students have access to the internet?

2. What academic activities do the students do on the internet?

3. What challenges do the students face online in their educational activities?

4. In what ways does internet accessibility affect the students' academic activities?

5. What is the difference between the male and female views of the internet accessibility?

Theoretical Framework

This aspect of the work focuses on the appropriate theories that help to explain the issue at stake in this work. Two main approaches are used in this study.

Technological Determinism Theory. The critical assumption of the Technological Determinism Theory (TDT) is that a society's technology determines how its social structure and cultural values develop. The theory is believed to have been coined by Thorstein Veblen. Author [5] notes that Marshall McLuhan, in his work on technological determinism, states that people in society live in a new age of technology that has

not been witnessed before. These new media transform how people think, act and feel, adding that this technological environment is a critical landmark in communication. Agreeing with this, [6] adds that technological determinists explain that technology, particularly communications technologies, is the foundation of society's past, present and future, pointing out that technology in the forms of writing, print, television or the computer transforms society.

The TDT comes in handy in this study because it is the technology of society that determines how people interact with one another and carry out some of their daily activities. In the ODL, technology plays a key role as learners and instructors use the internet to facilitate their academic activities. The internet is seen as a primary factor that determines how lessons and educational resources are packaged by the instructors and delivered to the learners. It enables them to interact to enhance learning.

Media Dependency Theory. The Media Dependency Theory (MDT), developed by Sandra Ball-Roacheach and Mervin De Fleur in 1976, focuses on the relationship existing between the media audience and the media, which results in the audience relying on the media. It states that an individual depends on media information to meet specific needs, and such a person will rely on the medium that meets more of his/her needs than the ones that meet few. Also, [7] notes that the MDT explains the media's power and direct and indirect role in people's actions.

This theory is very appropriate in this work because it explains what happens at ODL. Although other media exist, none can meet the needs of distant learners and their educators like the internet. In line with the above, educators and students use internet platforms in teaching and learning. Due to technology, academic activities have gone beyond just face-to-face classroom affairs to online internet platforms. Teachers teach online, and students discuss on internet-based platforms and collaborate and share resources, which is even more applicable to ODL institutions. The internet serves multiple purposes for learners and instructors as they do most of their academic activities on it, even as it bridges the gap between them, offering them a platform they can use to meet their needs, irrespective of their locations. Given these benefits the internet offers, distant learners and educators rely so much on it to carry out their academic activities.

Literature review

Open and Distance Learning (ODL). The history of Open and Distance Learning may only be complete by emphasising that it first started as Distance Education.

Distance Education refers to education that focuses on teaching methods and technology aimed at delivering lessons to learners that are not physically present in a conventional school setting, thereby giving access to learning when time or distance or both separate the source of information and the students [8]. Meanwhile, [9] describes Open learning as a form of learning that is flexible as it allows students to decide the learning options they prefer concerning time, place, and other learning methods. It means that Open Learning is learner-centred as it prioritises giving learners choices of the media of learning, area and pace of study, support channels, and the selection of entry and exit points.

However, ODL combines the two concepts. According to [10], Open and Distance Learning (ODL) is regarded as the best means for increasing education access, improving learning quality, encouraging peer-to-peer collaboration and providing students with greater freedom and responsibility.

The first Open University, The Open University, was established in 1969 and was a public distance learning focusing on research. It was among the largest university in the UK. The success of the Uk's Open University led to the founding of more Open Universities around the globe. Author [11] listed some other ones that were established afterwards, including Athabasca University, Canada's Open University was created in 1970, and Spain's National University of Distance Education in 1972, while Germany's Fern Universitat in Hagen came on board in 1974. On the home front, the idea of an open University was initiated in 1976, and other processes followed. Later in 2002, the National Open University of Nigeria (NOUN) was established during the tenure of a civilian President, Chief Olusegun Obasanjo, who demonstrated the relevance of the university by enrolling as a university student immediately after he left office as the President.

The Concept of Internet Accessibility. Internet access refers to connecting to the internet using a functional gadget, an influential network, having the skills and boldness to use them and a good knowledge of what to get on the platform [12]. This means that having internet accessibility will

allow an individual to do whatever he/she plans to do online as seamlessly as possible. In the ODL setting, distant learners must have efficient internet accessibility for almost all their academic activities. This implies that any hitch which affects their ability to connect to the internet could pose a problem to their work.

Internet Accessibility and Open and Distance Learning. Regarding the teacher's role in the ODL, [13] notes that the teacher's duty changes from a transmitter of information to a guide who meaningfully organises learner-centred experiences. The teaching and learning process in the ODL is highly interactive, so students are expected to have some skills that will help them to use some of the technological gadgets that can enable them to connect to the internet and take an active part in academic activities online. In line with the above, [14] observes that active participation is crucial in learning.

He further states that students learn better when they actively participate in interactive learning activities, adding that inactive participation would not help them learn well. Students learn from the materials made available by educators in various forms. They can be in printed words, audio format, or video form (audio-visual). The students can access all these materials available in multiple states online.

Meanwhile, [15] notes that technology plays a crucial role in online education and continues to do so in ODL among students due to its flexibility. Following the same line of thought, ODL educators found that the use of technology can enhance interaction and collaboration among learners and aid in handling many learners from different parts of the world, which makes its adoption a cheap teaching method [16]. Author [17] notes that learners admit the advantages of using technology in learning as they learn at their pace, study independently and enjoy the experience while accessing resources online using their gadgets. The importance of collaborative learning among the students of the ODL, separated by distance, is made possible by the internet. Also, [18] observes that interaction increases learners' motivation and boosts learning.

Internet Accessibility and Academic Activity. While the internet has been helpful in academic activities, especially in ODL, some challenges arise. Authors [19] note that the technical competence needed to have adequate access to modern technologies is a problem for some distance learners. [20] observes that access to technology is also a challenge, particularly in many parts of Africa, especially in the rural areas where infrastructure is inferior.

Pointing out some factors that can lead to the problem of access to the internet, [21] their study finds that the digital divide in Africa is a significant problem when compared with other countries, and this causes challenges to the use of technology for online teaching and learning. They note that anything that hinders distance learners from achieving their learning needs is the 'digital divide', affecting learners from low-income homes more.

However, [22] point out that effective learner support services that give room for a face-to-face, timely response on learners' academic performance and access to library services are necessary to improve their academic achievement. [23] note that countries need to fortify their educational institutions to flourish because students require suitable means of getting and sharing information quickly, adding that the use of this internet largely relies on factors such as purpose, students' experience, locations and internet facilities. In a perception study on NOUN, [24] discover that on the accessibility options, participants have different feelings concerning access to the internet due to the cost of entry, erratic services and internet issues in rural communities.

Gender and Internet Accessibility. In line with the mixed feelings expressed by participants as stated above, there is the need to consider if the gender of individuals plays any role in how they view internet accessibility. Do males see internet accessibility differently from the way their female counterparts see it? This is a question for consideration because people of different genders could view an issue differently or similarly.

Gender differences in internet usage and web information-seeking behaviours have attracted considerable research interest. Authors [25] find that social, economic and individual factors may be significant in understanding internet access. Also, [26] discover a substantial difference between the two genders as female readers strongly prefer paper as a reading medium to males, adding that male readers have a greater sense of satisfaction with online reading. Conversely, [27] has a different position pointing out that gender-specific difference exists, which cannot be explained just by studying the disparities in education or income and their effect on internet usage. Similar or more divergent views could still be found.

METHODOLOGY

This study employed a survey design. This method allowed the researcher to get and analyse the responses from many respondents, which provided valuable data for the analysis. The population of this study was the undergraduate students of NOUN Lagos State. To extract data from the students, a questionnaire was used. Bearing in mind that NOUN is a distant learning institution where it would be hard to see students physically present, making it difficult to reach many of them and extract data, a sample size of 120 was adopted as a template for this study. First, the researcher used a multi-stage sampling to cluster NOUN into four Study Centres, including the Victoria Island, McCarthy, Apapa and Mushin Study Centres. Secondly, the simple random sampling method was used to empirically select four faculties from Victoria Island, McCarthy and Mushin Study centres for the study. The faculties (with two Departments from each) that were set include the Faculty of Arts (Department of English and Department of Philosophy), Faculty of Law (Department of Commercial Law and Department of Private and Property Law), Faculty of Management Science (Department of Business Administration and Department of Financial Studies), and Faculty of Sciences (Department of Computer Science and Department of Environmental Sciences). Copies of the questionnaire were randomly administered to the respondents from the set faculties, with 40 participants drawn from McCarthy Study Centre because it is the second largest centre and 30 from Mushin Study Centre. After all, it is the smallest of the three, while 50 participants were from Victoria Island Study Centre because it is the largest centre.

The study adopted the test-retest method. The instrument was initially administered to 30 students of NOUN during two pilot studies at different intervals to get their responses to the questions and measure the result. Pearson's r correlation coefficient of the two effects was consistent, confirming the instrument's reliability.

RESULTS AND DISCUSSION

Having distributed the questionnaire to the respondents considering all genders, age groups, levels and faculties, the study ensured that criticisms that might arise from the distribution of the instrument were avoided. Out of 120 copies of the distributed questionnaire, 115 documents were retrieved for analysis. Therefore, 115 copies of the questionnaire were analysed, giving a response rate of 96%.

Table 1 – Summary of Respondents' Demography

Features		Frequency	%
Age	15-18	-	-
	19-22	-	-
	23-26	19	16.5
	27 and above	96	83.5
	Total	115	100.0
Gender	Male	76	66.1
	Female	39	33.9
	Total	115	100.0
Level	100	10	8.7
	200	12	10.4
	300	18	15.7
	400	30	26.1
	500	45	39.1
	Total	115	100.0
Faculty	Law	57	49.6
	Arts	13	11.3
	Management Science	28	24.3
	Science	17	14.8
	Total	115	100.0

Data collected in tandem with the first research objective showed that most respondents have access to the internet using their mobile phones, which means that they use more personal and portable devices to access the internet from their locations (Table 2).

Table 2 – Summary of Devices Respondents Used to Access the Internet

Response	Frequency	%
Desktop Computer	10	8.7
Laptop	22	19.1
Mobile Phone	83	72.2
Others	-	-
Total	115	100.0

In line with the second objective, the study found that doing Tutor Marked Assignments (TMAs), getting academic information and doing research are most students' primary educational activities on the internet.

This shows that they take their assignments on the internet more seriously and do other vital academic work that can impact their performance (Table 3).

Table 3 – Summary of activities respondents use the internet platform for

Response	Frequency	%
Reading academic materials	17	14.8
Sharing documents	7	6.1
Getting academic information	23	20.0
Receiving lectures online from lecturers	12	10.4
Having academic discussions with tutors and colleagues	2	1.7
Doing research	18	15.7
Doing Tutor Marked Assignment	36	31.3
Total	115	100.0

Data collected based on the third objective have shown that most students face connection problems due to issues from the network providers. At the same time, the second main challenge they experience is connection problems arising from the school's portal. These are not problems arising due to the learners' fault; they can affect the student's academic activities if they are not addressed (Table 4).

Table 4 – Summary of challenges respondents experience during academic activities

Response	Frequency	%
Problem of getting connected to the internet due to network provider's issue	68	59.1
Inability to connect to the school's website due to portal problem	27	23.5
Problem of internet access due to inability to pay for subscription	11	9.6
Disruption in internet connection due to poor internet coverage in your location	9	7.8
Total	115	100.0

A critical analysis of the data collected based on the fourth objective showed that the problems of internet accessibility hinder many of the respondents from doing their TMAs which are usually time-bound. These challenges also prevent them from reading/downloading academic materials online and make them miss vital educational information. These issues affect the student's learning experience and their performance (Table 5).

Table 5 – Ways the challenges of internet accessibility affect respondent's academic activities

Response	Frequency	%
It prevents me from getting academic information	21	18.1
It prevents me from doing my Tutor Marked Assignments	45	39.1
It hinders me from taking active part in online lectures and academic discussions	10	8.7
It prevents me from reading academic materials online and downloading them as well	39	34.0
Total	115	100.0

The data collected in line with the fifth objective of the study showed that a higher percentage of males revealed that internet accessibility problems disturb their academic work regularly than their female counterparts. Also, more male respondents admitted they have the issues occasionally (Table 6).

Table 6 – Respondents' view on internet accessibility

Response	Frequency		%		Total
	Male	Female	Male	Female	
It gives me regular problem in my academic work	50	27	43.5	23.5	67
It does not give me problem at all because I enjoy it regularly	1	1	0.9	0.9	1.8
It gives me problem occasionally in my academic work	23	10	20	8.7	28.7
Undecided	2	1	1.7	0.9	2.6
Total	76	39	66	34	100
	115		100		

CONCLUSIONS

After critically analysing the data collected in the course of this study, the researcher made the following findings:

1. While seeking to find out how distant learners can access the internet, the study showed that most accessed it mainly through mobile phones. This indicates a higher phone usage rate by the

students who also use self-sponsored data subscriptions to access the internet.

2. In trying to find out the academic activities the students carry out on the internet, the work found that most of them use it to do Tutor Marked Assignments (TMAs). Findings further showed that they also use it to get academic information, research, engage in tutorials, and share and read educational materials. This showed that the internet serves different purposes for distant learners, hence why any disruption in its accessibility is a significant issue for the learners. This agrees with the submission of [15].

3. Having sought to ascertain the challenges students face while accessing the internet, the finding revealed that most of them face difficulties accessing it. Most of the issues come from network providers and school portal problems. Others need better network coverage and help to pay high data subscription charges. This finding aligns with the position of [20] but provides more insight into the issues.

4. In an attempt to determine how internet accessibility affects the academic activities of the students, the study revealed that the difficulties the learner's experience in accessing the internet affect the extent they take an active part in educational activities, as a number of them miss or fail to do TMAs/tests on time, many of them are unable to read, download and share academic materials. In contrast, others are unable to join online lessons and group discussions. All these challenges adversely affect their educational activities.

5. In a bid to assess the difference in male and female views of the internet accessibility, the finding shows that while both genders admit to having difficulties accessing the internet, more male respondents face these challenges than their female counterparts. This agrees with the submissions of [21] and [26].

Summarily, after making the following findings, this study submits that many NOUN students in Lagos State use the internet for different academic purposes. Still, a majority of them face internet accessibility issues. Indeed, the internet plays essential roles in open and distance learning, making the two theories applicable to this study. The Technological Determinism Theory, which posits that a society's technology determines the development of the society's social structures and cultural values, comes in handy here. The theory also asserts that the technology of an organisation plays critical roles in the way of life and pattern of interactions of members of the society, and this is what the internet does for both the distant learners and their teachers as it determines the way of teaching, learning and other academic activities in ODL. Similarly, the Media Dependency Theory is appropriate in this work because people rely so much on the medium that meets most of their needs at different times. This is what the internet does for the ODL students and the teachers as they depend on the platform for most of their academic activities making the internet wield so much influence on them in line with the position of [7].

Given the findings above, the researchers make the following recommendations:

1. The National Open University of Nigeria (NOUN) should improve its portal and network service to give the students seamless access to the school's online platforms to do their academic activities without any hindrance.

2. NOUN should provide a high-speed internet facility within its premises and Study Centres across the country to enable students around the school to have more internet access, beyond smartphones, to access academic resources online.

3. NOUN should integrate practical computer training in the course content for learners at all levels. This will equip learners with computer skills that will enable them to use different ICT facilities. Screening for admission in distance education should include a practical demonstration of ICT/Computer literacy skills by the prospective students.

4. The school needs to provide offline options for some academic activities, which will allow the students to write and submit TMAs and other tests offline to help students in rural areas where the network is usually poor to do their academic work still. It will also take care of some students (especially the old ones and non-tech-savvy learners) who have not yet mastered operating internet-based devices and modern gadgets until they adapt to the system.

5. NOUN should collaborate with telecommunication companies that provide data services to negotiate subsidised data plans for distant learners. This will be of significant help, especially to low-income households, since most of them access the internet and e-resources mostly from their mobile phones using self-sponsored mobile data.

REFERENCES

1. UNESCO. (2002). *Open and distance learning. Trends, policy and strategy considerations.* Paris: UNESCO.
2. COL. (2015). *Commonwealth of Learning Strategic Plan 2015-2021*. Retrieved from https://oasis.col.org/items/c42c76c3-d7a9-4384-8e29-db2dcf5d71cc
3. Ivwighreghweta, O., & Igere, M. A. (2014). Impact of the internet on academic performance of students in tertiary institutions in Nigeria. *Journal of Information and Knowledge Management, 5*(2), 47–56.
4. Emeka, U. J., & Nyeche, O. S. (2016). Impact of Internet Usage on the Academic Performance of Undergraduates Students: A case study of the University of Abuja, Nigeria. *International Journal of Scientific & Engineering Research, 7*(10), 1018–1029.
5. Amobi, I. (2010). *New Generation, New media and Digital Divide: Assessing global digital divide through ownership, literacy, access and usage of Internet and Social media by young people in Nigeria*. Retrieved from https://silo.tips/download/new-generation-new-media-and-digital-divide-assessing-global-digital-divide-thro
6. Chukwu, C. O. (2014). Online journalism and the changing nature of traditional media in Nigeria. *International Journal of African Society Cultures and Traditions, 2*(3), 1-9.
7. Zhang, L., & Hung, H. (2021). On Social Involvement in Mingling Scenarios: Detecting Associates of F-Formations in Still Images. *IEEE Transactions on Affective Computing, 12*(1), 165–176. doi: 10.1109/taffc.2018.2855750
8. Honeyman, M., & Miller, G. (1993). Agriculture distance education: A valid alternative for higher education? *Proceedings of the 20th Annual National Agricultural Education Research Meeting*, 67–73.
9. Caliskan, H. (2012). Open Learning. *Encyclopedia of the Sciences of Learning*, 2516–2518. doi: 10.1007/978-1-4419-1428-6_52
10. Calvert, J. (2006). *Achieving development goals. Foundations: Open and Distance Learning, lessons and issues*. Retrieved from http://pcf4.dec.uwi.edu/addons/docs/sample1_old.doc
11. Jegede, O. (2016, July). *Open and distance learning practices in Nigerian higher institutions of learning*. Retrieved from https://www.olugbemirojegede.com/odl_practices_in_tertiary_institutions_in_nigeria.pdf
12. Backhouse, J., & Chauke, H. (2020). Development Impacts of Free Public Wi-Fi in Johannesburg. *Advances in Information Quality and Management*, 374–395. doi: 10.4018/978-1-7998-2610-1.ch018
13. Muirhead, B. (2001). Practical Strategies for Teaching Computer-Mediated Classes. *Journal of Educational Technology & Society, 4*(2), 1–12.
14. Seckel, S. (2007). Characteristics and responsibilities of successful e-learners. *Journal of Instruction Delivery Systems, 21*(2), 22–26.
15. Bonk, C. (2006). *The Future of Online Teaching and Learning in Higher Education: The Survey Says*. Retrieved from https://er.educause.edu/articles/2006/11/the-future-of-online-teaching-and-learning-in-higher-education-the-survey-says
16. Botham, R., & Mason, C. (2007). *Good practice in enterprise development in UK higher education*. Birmingham: National Council for Graduate Entrepreneurship.
17. Hegarty, C. (2006). It's not an exact science: Teaching Entrepreneurship in Northern Ireland. *Education + Training, 48*(5), 322–335. doi: 10.1108/00400910610677036

18. Hyo-Jeong, S. O. (2010). Towards rigor of online interaction research: implication for future Distance Learning Research. *TOJET: The Turkish Online Journal of Educational Technology, 9*(2), 256–263.

19. Thompson, K. M. (2004). *Virtual Inequality: Beyond the Digital Divide*. Washington: Georgetown University Press. doi: 10.1086/382851

20. Molawa, S. (2009). *The "First" and "Third World" in Africa: Knowledge Access, Challenges and Current Technological Innovations in Africa*. Retrieved from https://wiredspace.wits.ac.za/items/3285416e-c6ef-47df-9d3c-b5803edbda1e

21. Oladokun, O., & Aina, L. (2011). *ODL and the impact of digital divide on information access in Botswana*. Retrieved from https://ubrisa.ub.bw/handle/10311/971

22. Kamau, J. (2007, March). *Retraining primary school teachers against diminishing resources: Is distance education the answer?* Conference paper, UNESCO, Second Regional Seminar for Africa, Accra Ghana.

23. Fasae, J. K., & Aladeniyi, F. R. (2012). *Internet use by students of faculty of science in two Nigerian universities*. Retrieved from https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1837&context=libphilprac

24. Osang, F. (2012). *Internet access in Nigeria: perception of National Open University of Nigeria (NOUN) students*. Retrieved from https://silo.tips/download/internet-access-in-nigeria-perception-of-national-open-university-of-nigeria-nou

25. Norris, D. F., Fletcher, P. D., & Holden, S. H. (2001). Is your local government plugged in? Highlights of the 2000 electronic government survey. Washington: County Management Association.

26. Liu, Z., & Huang, X. (2008). Gender differences in the online reading environment. *Journal of Documentation, 64*(4), 616–626. doi: 10.1108/00220410810884101

27. Winker, G. (2005). Internet research from a gender perspective Searching for differentiated use patterns. *Journal of Information, Communication and Ethics in Society, 3*(4), 199–207. doi: 10.1108/14779960580000273

Planning in the Implementation of School Operational Assistance in Regular SMPN and SATAP in Praya Barat District, Indonesia

Sapri [1], **Sudirman** [1], **Fahruddin** [1]

[1] *University of Mataram*
Jl. Majapahit No 62 Mataram, Nusa Tenggara Barat, Indonesia

DOI: 10.22178/pos.89-4

LCC Subject Category: L7-991

Received 20.12.2022
Accepted 29.01.2023
Published online 31.01.2023

Corresponding Author:
Sapri saprimedain79@gmail.com

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. This study aimed to determine how to plan to implement school operational assistance in the school SMPN SATAP, Praya Barat District, Indonesia. This research uses a qualitative descriptive, evaluative method with a case study technique. Data collection techniques used interviews, observation, interviews, documentation and assessment scale sheets for school principals, treasurers, committees and teachers. The study results found that the budget planning complies with the BOS technical guidance financing standards contained in the School Budget Work Plan (RKAS). The school operational assistance fund is implemented by planning, budgeting, monitoring, and accountability.

Keywords: Management; Planning; BOS Funds.

INTRODUCTION

Education Funds are essential to Instrumental Input in the School Education Implementation process [1]. The sources of Education Funds include the Central Government (APBN), Local Government (APBD), Donations, and Parents of Students. One effective form of Basic Education Funding from the APBN is the School Operational Assistance Fund (BOS) [2].

The implementation of the School Operational Assistance Fund (BOS) programme is one of the more rational government programmes in the education sector and absorbs an enormous budget in allocating towards improving human resources and is directly related to the livelihood of the wider community [2, 3]. With the existence of BOS, the government can ease the burden on society for Education Funds in the context of 12-year compulsory education.

The Ministry of Education and Culture leads the School Operational Assistance Programme. In the implementation process, BOS Funds must be based on the guidelines in the Technical Guidelines for the Use of BOS Funds.

In the implementation and management of the School Operational Assistance Fund, it is used to fund non-personal operational costs, such as costs for consumable educational materials or equipment, and indirect costs in the form of power, water, telecommunication services, maintenance of infrastructure, overtime pay, transportation, consumption, taxes, insurance and others [4, 5]. Using the School Operational Assistance Fund, funds are prioritised for non-personal operational needs, not investment and teacher welfare. As a form of accountability in implementing active school assistance, each programme manager at each level (Central, Provincial, Regency/City) must report on the realisation of using BOS funds [6].

The financial report in the school operational assistance fund consists of details of the activity plan and budget (RKAS), general cash book, cash assistant book, bank assistant book, tax assistant book, statement of the use of BOS funds, a realisation of the use of BOS funds, recapitulation of the completion of the use of BOS funds, payment request letter, receipt/proof of receipt, and receipt/proof of payment issued by the school [7–10].

The existence of government policy in the School Operational Assistance Fund means that the problems of education in Indonesia have continued in the distribution and reality of the BOS funds. The financial management of BOS funds is that many schools still need to effectively implement the financial management system of BOS funds per the applicable principles. Regular SMPNs and Satap SMPNs, which are the implementation of government programmes, are very interesting in studying the existence of Regular Bos and Cumulative Bos. Praya Barat Daya subdistrict is a sub-district located in Central Lombok district, and there are 4 Regular schools and 3 Satap SMPNs, while only one of the Satap schools can get the cumulative boss and the other cannot.

For these reasons, researchers are very interested in researching the issue of Regular BOS and Cumulative BOS to improve the quality of education in Indonesia in general and Central Lombok in particular.

METHODS

The research conducted in Regular SMPN and Satap SMPN in Southwest Praya Sub-district is qualitative. This study's primary data sources came from the Principal, Teachers and Students. Secondary data sources are written sources that complement primary sources such as books, magazines, and personal or official documents. The official documents in this study were documents about the school profile, vision and mission, BOS Annual Activity Plan (RKT), BOS Accountability Report (LPJ), teacher data, and others.

The data analysis used in this research was descriptive qualitative analysis. Qualitative descriptive analysis is a general method, experimental and statistical methods. This analysis was used because the researcher wanted to know whether there were similarities or differences in implementing BOS funds between SMP Negeri 01, SMP Negeri 02, SMP Negeri 03, SMP Negeri 04 Regular and SMPN Satap 5, SMPN Satap 6, SMPN Satap 7.

In this research, the data collection methods or techniques used were interviews, observation, and documentation. In this study, researchers interviewed the Principal, Teachers and Students. In this research, researchers made several observations or observations of the school so that researchers could easily find out how the condition of the school, geographical location, extracurricular activities, facilities, and infrastructure in the school which was the object of research. Documentation is obtaining data about things or variables through notes, transcripts, books, newspapers, magazines, inscriptions, meeting minutes, agendas, etc.

RESULTS AND DISCUSSION

School financial management, especially BOS funds, dramatically support the smooth implementation of teaching and learning activities at school.

To find out how the school makes budget planning, the researcher asked several questions to 5 informants, namely the school principal (informant 1), the Head of Administration (informant 2), the Treasurer (informant 3), Teachers (informant 4) and the committee (informant 5). Each informant answered the questions asked by the researcher to complement and refine the data and research findings, extracting information from informants 1, 2 and 3 to obtain data on school financial management, while informants 4 and 5 to get information on teacher and committee participation in budget planning.

According to the informants above, budget planning at Satap and Regular SMPNs refers to the School Activity Plan (RKS), Annual Work Plan (RKT), and Medium Term Work Plan (RKJM), in the preparation of the School Budget Activity Plan (RKAS) the school involves all components/school community and school committee, by paying attention to the systematic practice of RKAS and looking at the education calendar in making school shopping schedules and price standardisation by regional regulations. The School Budget Activity Plan (RKAS) is prepared jointly between the school community, namely teachers and the school committee. Based on the explanation of informant 1, funds are obtained from only one source, namely BOS funds, and it is prohibited to collect funds from students.

The BOS funds are 100% well utilised for developing education itself. This can be seen from the details of the programmes and activities of Satap and Regular SMPNs in 2021 which are very favourable to improving the quality of learning.

Budget allocations that favour efforts to improve the quality of education are very priority and es-

sential, such as involving teachers and principals in MGMP and MKKS, comparative studies, training/workshops/seminars, salaries and employee welfare, and fulfilling KBM equipment.

To obtain data on identifying, classifying and estimating the sources of funds explored and developed by the school, researchers sought data through informant 2, namely the Head of Administration. To obtain this information, the researcher asked two questions to informant 2, namely, how does the school identify the acquisition of sources of funds to be explored and developed?

According to informant 2, identifying sources of funds to be explored and developed by the school is only BOS funds. In contrast, funds from other sources in the form of money only expect additional assistance from the district government and the state budget in the form of disbursement of funds for workshops, training, construction of RKB and development of art activities, even then, if they can. Meanwhile, assistance from the committee, in this case, student guardians, is not allowed. The technical guidelines use funds obtained from BOS for the use of BOS funds. In contrast, funds from other sources are used per the technical guidelines for implementing these activities.

According to informant 1, the preparation of the budget plan begins with the identification of objectives. The school will collect the programmes proposed by the teachers and then sort out which ones are priorities and which are not. Priority ones will receive moral and material support from the school and are then determined as one of the work programmes stipulated in the RKT and RKAS. At the same time, those that have yet to be made a priority still receive support and support, but their implementation is not permanently stipulated in the RKAS.

Of the 12 intracurricular and extracurricular coach teachers who were asked, almost all of them or 90% of respondents, gave the same answer: at the beginning of the school year, the school asked them to submit a work programme accompanied by a budget for their activities. This means there is good coordination between the management/financial management, in this case, the BOS funds, and the KBM programme conducted by the teachers.

Based on the results of the interview with informant 1, it was found that in the preparation of the RKAS, there was a division of the budget based on a priority scale. According to informant 1, the main priority is implementing the main activities, namely learning, starting from planning, implementation, evaluation, remedial and enrichment. The rest is for the development of extracurricular activities and strengthening character education.

Based on the results of the interview with informant 1, it can be seen that the school makes a budget plan that describes the objectives in an operational display that can be measured. The active show in question is the RKAS, where the RKAS contains various kinds of programmes that will be carried out, ranging from daily, monthly or long-term ones in the future.

RKAS helps the school to be more focused on running the wheels of its educational organisation, although what is listed with what is practised sometimes needs to be in line. However, the RKAS is not rigid; there is still a flexible area that can be modified as long as the orientation of the change is for the school's good.

Thus, budget planning, one of the indicators of the implementation of school financial management, in this case, BOS funds, is significantly correlated with the smooth performance of learning and teaching activities, intracurricular and extracurricular. The more professionally the management of BOS funds is managed, the better the quality of education produced.

The obstacles that are often faced by the managers of Satap and Regular BOS funds at SMPN Praya Barat Daya in planning the use of the BOS funds budget are:

1. The size of the school budget exceeds the existing budget ceiling.

2. Lack of proactivity and tardiness of teachers, trainers, coaches and those in charge of preparing and depositing the budget to the BOS fund manager.

At the beginning of the school year, the school asked coaches, trainers and teachers to propose a work programme with a budget for their activities. This means there was good coordination between the management/financial management, in this case, the BOS funds, and the KBM programme conducted by the teachers. Then in the preparation of the RKAS, there was a budget allocation based on a priority scale. The main priority is implementing the main activities, namely

learning, starting from planning, implementation, evaluation, remedial and enrichment. The rest is for the development of extracurricular activities and strengthening character education. The allocation is also based on the percentage the government has determined, such as 20% for the purchase of books and 15% for salaries or honoraria for teachers and school employees.

BOS fund managers also made budget plans that outlined objectives in operational displays that could be measured. The active show in question is the RKAS, where the RKAS contains various kinds of programmes that will be carried out, starting from daily, monthly or long-term programmes. Thus, the financial budget planning of the BOS Satap and Regular SMPN Praya Barat Daya has been appropriately implemented by the management of BOS, namely School-Based Management (MBS), where schools are given freedom in planning and managing finances. However, several components have had their allocation percentage determined by the government based on the BOS technical guidelines.

CONCLUSIONS

Based on the results of the study, it can be concluded that the budget planning of the BOS Satap and Regular SMPN Praya Barat Daya has been carried out by the managers by the education financing standards and BOS technical guidelines contained in the RKAS which is synchronised with the School Work Plan (RKS). However, the manager of the BOS Satap and Regular SMPN Praya Barat Daya still needed help in planning the BOS fund budget.

REFERENCES

1. Mujayaroh, M., & Rohmat, R. (2020). Pengelolaan dan Pengalokasian Dana Pendidikan di Lembaga Pendidikan [Management and Allocation of Education Funds in Educational Institutions]. *Arfannur, 1*(1), 41–54. doi: 10.24260/arfannur.v1i1.151 (in Indonesian).

2. Sulfiati, F., Andi, S. A., & Andi, L. Irawan. (2019). Akuntabilitas Pengelolaan Dana Bantuan Operasional Sekolah (BOS) [Accountability of School Operational Assistance (BOS) Fund Management]. *Meraja Journal*, *2*(41), 185–201 (in Indonesian).

3. Jaya, I. (2014). Faktor-Faktor Keberhasilan Dan Ketidak Berhasilan Pemanfaatan Dana Bos Di Sumatera Utara [Factors of Successful and Unsuccessful Utilisation of Bos Funds in North Sumatra]. *Jurnal Tarbiyah*, *21*(1), 1–27 (in Indonesian).

4. Dewi, R., Wahyudi., & Sukmawati. (2016, October 28). Pengelolaan Dana Bantuan Operasional Sekolah Dasar Negeri 8 Sungai Raya Kabupaten Kubu Raya [Management of Operational Assistance Funds for State Elementary School 8 Sungai Raya, Kubu Raya Regency]. *Jurnal Pendidikan dan Pembelajaran Untan, 5*(10) (in Indonesian).

5. Latief, A. M., & Jamil. (2015). Evaluasi Pelaksanaan Program Bantuan Operasional Sekolah (BOS) Sekolah Menengah Pertama [Evaluation of the Implementation of the School Operational Assistance (BOS) Programme for Junior High Schools]. *Jurnal Utilitas*, *1*(1), 35–42 (in Indonesian).

6. Fathurrahman, L. (2017). Dampak Bantuan Operasional Sekolah (BOS) Terhadap Peningkatan Kualitas Pendidikan di Kabupaten Lombok Utara (KLU) [The Impact of School Operational Assistance (BOS) on Improving the Quality of Education in North Lombok District (KLU)]. *Jurnal Valid*, *14*(2), 129–150 (in Indonesian).

7. Andiawati, E. (2017). *Pengelolaan Keuangan Lembaga Pendidikan / Sekolah* [Financial Management of Educational Institutions/Schools]. Retrieved from https://jurnal.fkip.uns.ac.id/index.php/snpe/article/download/10646/7892 (in Indonesian).

8. Arwildayanto., Lamatenggo, N., & Sumar, W. T. (2017). *Manajemen Keuangan Dan Pembiayaan Pendidikan* [Financial Management and Financing of Education]. N. d.: Widya (in Indonesian).

9. Jaenudin, A., & Suroto. (2017). Analisis Pengelolaan dan Pengawasan Keuangan Sekolah di SD Negeri se-Kecamatan Way Tuba [Analysis of School Financial Management and Supervision in Public Elementary Schools in Way Tuba Sub-district]. *Universitas Sebelas Maret*, 1–9 (in Indonesian).

10. Pusvitasari, R., & Sukur, M. (2020). Manajemen Keuangan Sekolah Dalam Pemenuhan Sarana Prasarana Pendidikan (Studi kasus di SD Muhammadiyah 1 Krian, Sidoarjo) [School Financial Management in Fulfilling Educational Infrastructure (Case study at SD Muhammadiyah 1 Krian, Sidoarjo)]. *AL-TANZIM: Jurnal Manajemen Pendidikan Islam*, *4*(1), 94–106. doi: 10.33650/al-tanzim.v4i1.959 (in Indonesian).

Situational Leadership of the School Principal in Improving Teacher's Pedagogic Competence In Kindergarten Gugus 2 UPTD 1 Johan Pahlawan, West Aceh District, Indonesia

Syarifah Hardiyanti [1], **Nasir Usman** [1], **Yusrizal** [1]

[1] *Syiah Kuala University*
Jln. Teuku Nyak Arief, Darussalam, Banda Aceh, Aceh, 23111, Indonesia

DOI: 10.22178/pos.89-19

LCC Subject Category: L7-991

Received 20.12.2022
Accepted 29.01.2023
Published online 31.01.2023

Corresponding Author:
Syarifah Hardiyanti
Syarifahhardiyanti22@gmail.com

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. This study aimed to determine how the principal's instructive, consultative, participatory, and delegation styles improve teacher pedagogic competence in Kindergarten cluster 2 UPTD 1 Johan Pahlawan West Aceh District. This study uses a qualitative approach, namely the analysis and description of a symptom and phenomenon, attitudes, social activities and one's thoughts in both groups and individuals. According to the study, the principal's instructive style consists in improving teacher pedagogical competence. This can be seen in the principal's indicator of directing teachers to complete administrative tasks related to curriculum or syllabus development. The consultative style of the principal is more on the planning aspect of learning and implementation of knowledge. The principal's participative style increases teacher pedagogic competence on academic indicators. The delegation style of the principal delegates the task to a person deemed competent to complete the job when the top leaves school for official business and if the principal is sick.

Keywords: Situational leadership; pedagogic competence; education.

INTRODUCTION

Education is an investment in the development of human resources because, with education, humans can improve their skills and abilities. Education contributes significantly to the progress of a nation and is a vehicle for translating the message of the constitution and a means of shaping the nation's character.

Leadership as one of the management functions is critical to achieving organisational goals. Leaders must face a variety of factors, such as structural or order, coordination, power, and organisational environmental conditions. According to [1] "Leadership is the process of influencing others to understand and agree on the needs that must be met and how to act on them, as well as the process of facilitating individuals and groups to try to achieve common goals". Every leader has their way or technique of running the wheels of leadership to achieve organisational goals.

The success of a school in improving the quality of education is strongly influenced by the principal's ability to lead his subordinates, especially teachers. Therefore, principals must increase and develop the competence of teachers in their schools, especially in the aspect of pedagogical competence. Principals play an essential role in expanding the school's potential for both teachers to achieve school goals as expected. In carrying out its duties, principal leadership will try to implement appropriate policies for the school's success. The principal's policy is implementing his leadership style in leading the school. All subordinates, including teachers, will then perceive this leadership style.

The situational leadership style is more flexible in school operational conditions. Authors [2] state that "Situational leadership of school principals is based on skills in providing the intensity of guidance, direction, and socio-emotional support by school principals to subordinates or teachers and education personnel by taking into account their level of readiness and maturity". Then [3] revealed that "Principal leadership includes four styles including; telling style, selling style, participating style, and delegating style. Principals use the four styles in carrying out their

duties and responsibilities at school". The four basic styles in situational leadership style are essential for a principal in influencing teachers and education personnel.

Pedagogic competence is an important thing that teachers must master because academic competence is the main requirement in organising effective learning for students to achieve educational goals. According to Law no. 14 of 2005 concerning Teachers and Lecturers, Pedagogic competence is a set of knowledge, skills and behaviours that must be owned, lived and mastered by teachers or lecturers in carrying out their professional duties.

One of the main factors determining the quality of education is the teacher. Teachers are at the forefront of creating quality human resources. Teachers deal directly with students in the classroom through the teaching and learning process. The teacher is a learning manager responsible for planning, implementing, and assessing changes or improvements in the learning programme. Therefore, teachers must understand and master pedagogical competence. An effective and efficient learning process can be realised through optimal efforts from teachers. Teachers need to plan the learning process, assess learning outcomes, and follow up on the learning process results. In reality, the stages of the learning process still encounter many problems.

For example, many teachers still need to understand various learning strategies so that the learning carried out by some teachers is less varied. Then the teacher tends to only convey the subject matter in the learner textbook, without being accompanied by explanations and more contextual examples. Furthermore, the lesson plans teachers have are generally prepared with the KKG or copied without any modifications and revisions to adapt to the learners and the conditions of each school. Some teachers prepare lesson plans to fulfil administrative needs (promotion materials and teacher professional certification proposal materials), not to guide the learning process.

The success or failure of the implementation of educational programmes at the school level cannot be separated from the role of the principal as a leader. Principals need to apply a leadership style to the readiness of the teachers, where each teacher has a willingness to work that is different and very varied. Situational leadership is the right style to overcome the problems experienced by teachers according to the situation and conditions of other teachers, so this leadership is considered very flexible to use. Then the principal is always expected to monitor the development of the teachers and supervise or coach them so that the teaching and learning process becomes effective. The quality of the principal's leadership in fostering these teachers is essential to improve pedagogical competence, which will impact the effectiveness of a learning process.

METHOD

In this study, a qualitative approach was used. This research focuses on the principal's leadership in improving teacher pedagogical competence in Kindergarten Gugus 2 UPTD 1 Johan Pahlawan.

This study aimed to help principals, vice principals, supervisors and teachers. The issues of this study were principals and teachers who were involved in providing information related to the research conducted.

Research instruments intended as data collection tools in this study are a grid sheet equipped with interview guidelines in the form of questions, observation guidelines and documentation guidelines from all observation activities. The instrument includes aspects of responsiveness, can adjust and act as a reference for the author in collecting data.

In this study, researchers used descriptive-qualitative data analysis techniques, namely describing the data obtained through research instruments.

RESULTS AND DISCUSSION

Principal's instructive style in improving teacher's pedagogical competence

Kindergarten in Padang City. Based on the results of research conducted at the kindergarten, the principal has implemented a situational leadership style, where the indicators of the principal's role in the Instruction/telling style have been implemented, such as the principal giving orders to teachers always to make clear and complete learning programme administration tasks that can support improving teachers' pedagogical competence such as in the aspect of developing curriculum. Then the principal also directs teachers with low competence in pedagogical competence indicators before carrying out work.

According to [4] "The application of the Telling / commanding style, a leader shows behaviour that provides a lot of direction and little support. This leader provides specific instructions about roles and goals for followers and strictly supervises their duties". In this case, the leader limits the role of his followers and tells them what, how, when and where to carry out various tasks. According to [5] "This Instruction leadership style is indicated by the behaviour of leaders who are high in direction and support. In using this style, the leader still gives a lot of focus and makes almost the same decisions. This is followed by increasing two-way communication and supportive behaviour by listening to followers' feelings about decisions made and their ideas and suggestions. Although support is increased, control over decision-making remains with the leader. The leader solely undertakes problem-solving and decision-making initiatives. Problem-solving and decisions are announced, and the leader closely monitors their implementation".

Nabila Kindergarten. In pedagogical competence, the principal's instructive style at Nabila Kindergarten refers to directing learning administration tasks, including curriculum development, which has done its job. The teachers have also carried out the study before being ordered directly by the principal. The application of instructive style in this pedagogic competence factor is more to the teacher's aspect in planning the curriculum development process and the learning process in the classroom. According to [6] "The curriculum is a set of plans and arrangements regarding the objectives of content and learning materials, as well as the methods used as guidelines for organising learning activities to achieve certain educational goals". Planning learning activities is beneficial for teachers in directing and optimising the learning process to improve optimal child development.

Seeing the importance and benefits of planning the learning process, teachers need to recognise, learn and use learning process planning before carrying out the learning process. The author says, "Telling the leader can inform subordinates about how, when, and where these activities are carried out". The principal's task in curriculum development is to tell the teachers to create a curriculum related to the field of action by existing products. At this time, the curriculum used is the K13 curriculum. Good instruction and supervision are necessary for this stage of leadership. Team members need to receive a lot of direction from the leader, so clear steps must be taken. The leader's job is to make final decisions to lessen the burden on members and help them progress. Therefore, the instructions given must be clear.

Al-Ikhlas Kindergarten. Applying the principal's instructive style at Al-Ikhlas Kindergarten has directed teachers to learn administrative tasks such as curriculum development. However, in the curriculum used, there has yet to be any improvement at all. It still uses the 2006 curriculum, not the K13 curriculum. However, the task of the head of the school is to mobilise teachers to revise the existing curriculum to the K13 curriculum with the direction and guidance of the head of the school because the teachers need more knowledge of reconstructing the K13 curriculum. According to [8], telling, namely when the leader behaves as "telling", then from this, it means that the task orientation of human resources can be said to be high, but the relationship between superiors and subordinates cannot be classified in the familiar category. So in practice, the leader formulates a role that will later be implemented for assistants by telling them what, when, how, and where activities and tasks are carried out. In other words, the leader's behaviour manifests and leads in a directive style. This style is applied to tell someone what, when, where, and how to do something and then the leader also closely monitors the person in teaching the target or task. But leaders must also value their transferable skills, initiative, and willingness to learn. According to [9], "Telling leadership situations occur when subordinates are unable to carry out tasks and are unwilling or afraid to try something new until they have to carry out a huge directing role and order what subordinates should do" Effective leadership with adaptive and flexible skills is considered as one way to lead an organisation can be done with situational leadership. What underlies the principal's situational leadership is the intensity of providing instructions, directing, providing socio-emotional support, and paying attention to the readiness and maturity of teachers and education personnel.

Tripa English School Kindergarten. Applying the principal's instructive style means telling the duties and functions to the teacher so that there is one-way communication. This model aims to enable educators to improve competence. The principle of English Schools applies this instructive style only to people who still need to understand pedagogical competence, such as new teachers. According to [4] "if a leader has a telling behaviour, it means that his task orientation can be

said to be high and combined with a superior-subordinate relationship that cannot be classified as familiar, although it is also not classified as a hostile relationship". In practice, what happens is that a leader formulates what role subordinates are expected to play by telling them what, how, when, and where activities are carried out. In other words, the leader's behaviour is manifested in a directive style [10]. An instructive leadership style is appropriate for teachers who are unable and unwilling to accept responsibility. Principals carry out strict supervision so that teachers can improve their performance. For this, the principal also needs to control and direct to remain good so that the style carried out is democratic.

The principal's instructive leadership style at Tripa English School Kindergarten is only in curriculum pedagogical competence. The teachers here often forget to make lesson plans, so the principal sometimes applies an instructive style. In implementing education in schools, principals with these characteristics are needed. Teachers and education personnel who are less capable and do not have the will must be balanced with the dominating attitude of the principal. Implementing learning in the current unstable educational climate will be difficult for teachers and education personnel who do not have high ability and willingness. Therefore a principal is needed who can diagnose teachers' or education personnel's readiness and maturity criteria.

Principal's consultative style in improving teacher pedagogical competence

Pembina Kindergarten Padang City. The consultative style in the principal's leadership at the Pembina Kindergarten in Padang City in improving pedagogical competence is more on lesson planning and lesson implementation, such as the implementation of learning, such as aspects of the use of teaching media, learning programme activities, and learning methods. In this aspect, principals often provide opportunities for teachers to manage classes for each teacher. The goal is to train teachers, and leaders only offer direction.

Pedagogical competence in analysing the aspects and stages of development of what is needed, potential talents, and interests of early childhood, then also in the design of the early childhood development process according to the curriculum. Then in hearing the development of educational activities, determining the scope of the target assessment of the process and learning outcomes in early childhood. Mastery of these principles requires an educational learning process by teachers in implementing the actual learning process. According to [11], "One of the educational learning approaches is the PAIKEM approach (Active, Innovative, Creative, Effective and Fun Learning)". This approach must be reflected in learning planning, implementing and organising learning and learning assessment. Therefore, teachers must apply various innovative strategies, methods, techniques, and procedures to make students learn in a free situation or condition.

Some aspects of pedagogical competence teachers discuss more with the principal. According to [9], "At this stage, members need to improve their skills. They also need to deepen relationships and trust in leaders. This is the basis for making decisions based on consideration of team members' suggestions and paying attention to team members". Applying the Selling style, the leader exhibits behaviours that direct and provide much support. This style is referred to as consultation because in using this style, the leader still gives a lot of direction and still makes almost the same decisions, but this is followed by increasing the amount of two-way communication and supportive behaviour by trying to hear the feelings of followers and their ideas and suggestions. But still, the leader must continue to provide supervision and direction in the completion of the tasks of his followers. The author [12] says that in "consultative leadership style, leaders provide opportunities to dialogue together, provide direction, and to clarify and help subordinates to be in line with the leader's wishes".

Nabila Kindergarten. This consultative style is usually applied to teachers with a moderate ability level. In this case, teachers who do not have the will to carry out their duties and responsibilities or who have confidence and feel able to carry out their duties need to be supported by their work skills and knowledge. Thus, the consultation style tends to provide directive behaviour and support for teachers. According to [10], "Consultation means that the head of the school communicates effectively and maintains relationships with his work partners in the hope that the tasks that have been notified in the Telling model above can be carried out properly by work partners by the directions and instructions given. Siagan also reinforces this expression. The author [13] notes, "consultation is a leadership style that prioritises persuasive communication

and guides subordinates more to achieve educational goals in a school". The application of the principal's consultative style in the aspect of learning programme activities and learning methods is given the trust of being managed directly by the class teacher.

In contrast, for the actions of the learning activity programme outside the school, the ideas of the principal's teacher only support and direct it. Then, in applying this learning media, communication between the foundation and the principal could be more conducive, so media use is often not realised. In contrast, in supervising teachers, the principal is rarely done.

Al-Ikhlas Kindergarten. Applying the principal's consultative style to teachers at Al-Iklhas Kindergarten has been implemented where teachers are trained in carrying out the learning process, creating learning methods in the classroom and designing for learning programme activities and evaluating the results of assessments in child development. However, facilitating learning media, namely the implementation of media in schools, still needs to be improved. There is no support from the principal because the head of the foundation is involved in providing media utilisation so that the media used is as it is. According to [13], the function of consultative leadership is two-way communication. At the first stage in making decisions, leaders often need material considerations that require consultation with the people they lead, who are considered to have various information materials needed in making decisions. The next stage of talk from the leader to the people he teaches can be done after the decision has been made and implemented. Facing teachers with a level of maturity or readiness requires skills from the principal with a good task focus to encourage teachers to work optimally. Then communication is also needed, whose purpose is to supervise and provide advice and decisions. Principals need to apply a leadership style to the teachers' conditions so that education implementation in schools can run smoothly.

Tripa English School Kindergarten. This consultative style is the principal's way of training orders and support. According to the results of interviews with principals regarding the consultative style, this style is beneficial for teachers to express the difficulties faced by teachers during the learning process. I, as the principal, can provide the right solution if the teachers have a problem managing teaching activities. This means that teachers often consulting with the principal can also create a close relationship with teachers emotionally.

Then the principal supervising teachers at school must do it with different determinants. This is due to the institution's situation or the subordinates' readiness. In the evaluation action, the principal often gives feedback on the results obtained to the teacher. This is done so that the teacher can understand where each individual's mistakes and advantages lie.

The principal's participative style in improving teachers' pedagogical competence

Padang City Kindergarten. Situational leadership participates principals as facilitators of teachers' tasks by creating two-way communication relationships, such as discussions with teachers and helping teachers deal with difficulties in carrying out their duties. The participation of the principal of TK Pembina Kota Padang in supporting teachers in learning activities can be seen from pedagogical indicators such as helping teachers in learning program activities, which are early childhood potential development programs to self-actualise, then supervising teachers in the process of child assessment results, evaluating early childhood development programs. The author [14] states, "Participating is doing things the leader wants. Their unwillingness is often due to a lack of confidence or insecurity. However, if they are competent but unwilling, their reluctance is a matter of motivation. Subordinates with this level of maturity need to open two-way communication channels to support followers' efforts to use the abilities they already have".

Principal leadership with this style of participation is also most often used by principals in the school environment where this leadership style includes all school members, namely teachers, in school programme activities such as one of the school programme activities there is a children's marching band as well as a theme peak and school service activities. Then the principal also often includes teachers in training by IGTKI or PAUDI teams or seminars and local works that can develop pedagogical competence. At this stage, teachers are competent in their skills. However, they still need more performance consistency and are not focused on the end goal. They are qualified but sometimes feel they need more work to do. This makes them feel insecure, and objections and leaders should support them to remove these insecurities and complaints. A

leader's support is needed. When a leader gives trust to team members, their confidence will increase, and they will not hesitate to establish good communication with the leader.

Nabila Kindergarten. This participative style is called participation because leaders and subordinates play a role in decision-making. Task efforts are unnecessary in this kind of maturity, but relationship efforts must be increased by opening two-way communication. In the application of the principal's participatory style in several indicators of pedagogical competence, the role of the principal participates in the activities of learning programs outside the school. Then in the hand of the application of Information Technology, the principal has not been able to facilitate it because the foundation still needs to provide it. Then for training that can develop the pedagogical competence of teachers at Nabila Kindergarten, they rarely participate because they rarely get opportunities from the education office and organisations such as IGTKI and the PIAUDI Team. According to [10], the participative leadership style says:

1) Leaders and subordinates are equally involved in decision-making and problem-solving or when the leader will make decisions.

2) Leaders give subordinates the freedom to carry out work.

3) Relationships with subordinates are well established and in an atmosphere full of friendship and mutual trust.

4) Motivation given to subordinates is based on economic considerations and on the importance of assistants in carrying out organisational tasks.

In carrying out this function, principals try to activate the people they lead, participating in making decisions and carrying them out. The leader's participation must remain in the process as a leader and not implementation. The author [9] conveys "The ability possessed by a leader in his involvement with subordinates for decision making where a leader makes it easy for subordinates because they have the knowledge and ability to complete their tasks".

Al-Ikhlas Kindergarten. Implementing the participatory style is called because leaders and subordinates play a role in decision-making. Task efforts are unnecessary in this kind of maturity, but relationship efforts must be improved by opening two-way communication. The participatory style of the principal in improving pedagogical competence is minimal because the foundation plays a role in all processes in the school. Then if there is communication between the principal and teachers, it is good, but the principal's contact with the foundation could be better. The effect of the disharmony between principals and teachers is that this needs to be clarified in making decisions that will be followed. This is one of the things that can reduce teachers' pedagogical competence, so teachers need to be more professional in teaching. According to [10], participating means that the principal in leading is oriented towards the assigned tasks while maintaining good relationships with his partners. This behaviour invites partners to play an active role in completing the work given, including decision-making. So the principal acts as a facilitator when their partners carry out the decision-making process to carry out their respective tasks. According to Harsey and Blanchard's leadership theory, this style supports. Leaders and individuals make decisions together. The leader's role is facilitating, listening, concluding, encouraging, and funding. Using this style, leaders and followers exchange ideas in problem-solving and decision-making. Two-way communication is enhanced, and the leader must listen actively. The responsibility of problem-solving and decision-making lies mainly with the followers. This is natural because followers can carry out the tasks.

Principal participation in assisting teachers in learning activities can be seen from pedagogical indicators such as assisting teachers in learning programme activities who supervise teachers in the learning programme. Then evaluating the early childhood development programme, principals often provide feedback to teachers specifically to improve the development of children's learning activities. This participation style can create a harmonious relationship between principals and teachers, as shown by the intensity of communication. Not infrequently, the principal asks for the opinions and input of teachers in improving any matters concerning learning programme activities. Then the principal also always provides motivation, appreciation, advice, and a positive teacher mandate.

Tripa English School Kindergarten. Supervision and direction are the duties of a principal, which is how the principal participates in knowing and involving himself with the teacher about the tasks to be given. This is to improve a conducive work situation. Situational leadership participates principals only as facilitators of teacher tasks by creating two-way communication rela-

tionships, such as discussions and consultations with teachers and helping teachers deal with difficulties in carrying out their duties. According to [4], "Participating is the behaviour of a leader, in this case, is a low task orientation combined with intensive superior-subordinate relationships. The most obvious manifestation of such behaviour is that the leader actively invites his subordinates to participate in decision-making. This means that the leader only plays the role of a facilitator to facilitate the assistants' tasks, which, among others, is done using effective communication channels. The author [1] states "Participative or supportive style because principals no longer need to do much in encouraging teachers and education personnel in carrying out their duties and obligations, because they already have competent abilities, they only need to establish good communication and share ideas with the principal so that their commitment and self-confidence increase. In participative leadership, principals also often motivate teachers to create fun learning, and principals encourage and support teachers in creating learning programmes that are creative, innovative and fun for children. Principal leadership with this participation style is also often used by principals in the school environment. This leadership style includes all school members, namely teachers, in school programme activities such as one of the school programme activities.

Principal's delegative style in improving the pedagogical competence

Padang City Kindergarten. This style is called delegation because leaders discuss problems with subordinates to reach an agreement on the definition of the problem. Then the decision-making process is delegated entirely to subordinates. According to [6], "Delagative leadership is the leader discussing the problems faced with subordinates and then delegating decision making and problem-solving to subordinates". Leaders provide ample opportunities for subordinates to exercise control over their tasks because they have the ability and confidence to develop responsibility for directing their behaviour.

Nabila Kindergarten. The application of the principal's delegation style at Nabila Kindergarten for pedagogical competence has also been fully given to teachers. The principal's delegation style is the most dominant because the principal has delegated all aspects of pedagogical competence to teachers. The principal's job is to direct, supervise, and guide teachers in improving pedagogical competence. The author [5] notes, "Leadership with a delegating style is applied to subordinates who have a high level of maturity, namely able and willing. Thus a low-profile "delegation" style that provides little direction or support has the highest level of effective possibility. Subordinates can decide how, when, and where to do the work. This style involves low work relationship behaviour and low task behaviour."

Al-Ikhlas Kindergarten. This delegation leadership style has been applied relatively by the principal to the teacher. As in the learning activities process, the principal allows teachers to manage learning activities according to their innovations. This style is applied if the ability and willingness of subordinates are high. This style is called delegating because assistants can conduct their activities through general supervision. This is usually done if the associates are at a high level of maturity. In this level of maturity, task efforts are only needed occasionally as our relationship efforts. According to [12], "The principal monitors the work of the teacher. The principal gives full responsibility to the teacher in completing the work". According to [13], states “Leaders can allow children to make decisions and be able to take responsibility. Leaders can delegate their findings to their subordinates because leaders believe in the level of readiness possessed by their associates and are responsible for what they decide (weak relationships, light tasks)".

From the above, it can be concluded that the leader does not use his time and effort by doing the same job as his followers but concentrates more on planning, directing, and providing instructions and explanations to them about a job. Then situational leadership in relationship behaviour, according to [5], says, "a leader's behaviour who wants to maintain personal relationships between himself and group members by opening broad lines of communication, delegating responsibilities and allowing subordinates to use their potential. This is characterised by social-emotional support.

From the above opinion, a leader always tries to maintain good relations with his followers through communication. Leaders provide socio-emotional support by listening to their followers' complaints. In addition, leaders also motivate so that followers become confident and willing to participate in every job. The author [14] explains,

"Supportive task behaviour that correlates with effective leadership includes paying attention to trust and trust, acting friendly and caring, trying to understand problems, helping to develop followers, showing appreciation for followers' ideas and giving recognition to followers' contributions and successes".

This relationship-oriented behaviour is similar to the behaviour called "consideration" in leadership studies conducted by Ohio State University. Then the Michigan Study also found that influential leaders tend to use general supervision rather than strict control. This means that leaders set goals and general guidelines for followers, provide some autonomy, decide how to do a job, and determine work goals. From the explanation of task behaviour and relationship behaviour, it is concluded that good leadership should pay attention to both behaviours. A leader must provide instructions and directions on how to do a task, when and who should be responsible, offer support and encouragement, and be willing to listen to the opinions of his followers.

Based on the theoretical basis, it is revealed that a leader has an excellent situational leadership style, which is a technique used by leaders who will influence subordinates to achieve organisational goals by using a leadership style approach, instructive, consultative, participative, and delegation. Then the teacher will carry out his teaching duties well. This is the opinion of [7] "the determining factor for the success of a leader includes leadership techniques, namely how a leader can create a situation that causes the people he leads to raising awareness to carry out what a leader wants". Based on situational leadership theory, the Hersey and Blanchard model explains the concept of the relationship between effective leadership behaviour and individual maturity in carrying out their duties and responsibilities. Maturity here is intended to describe the readiness and ability of members or subordinates to carry out the tasks set by the leader.

Implementing the principal's situational leadership style in improving the pedagogical competence of kindergarten coaches is well applied. The situational leadership style of the principal in its implementation, cooperation, motivation and openness in helping teachers in the learning process. In situational leadership, improving pedagogical competence is more dominant in instructive, consultative and participative styles. The researcher also considered that the situational leadership of Hersey and Blanchard has many advantages compared to other situational leadership because this leadership requires flexibility. Then the researcher sees that this situational leadership theory can be applied in any field, including education.

CONCLUSIONS

Based on the results of the research, it can be concluded as follows:

1. Kindergarten Gugus 2 UPTD 1 Johan Pahlawan implemented the principal's instructive style. This can be seen in the indicator that the principal directs teachers to complete administrative tasks related to curriculum or syllabus development. In developing this curriculum, the principal wants to make changes for schools that still use the old version, namely the 2006 curriculum (the principal intends to use the K13 curriculum).

2. The consultative style in the principal's leadership in kindergarten Gugus 2 UPTD 1 Johan Pahlawan is more on learning planning and implementation, such as learning media utilisation, learning programme activities, and learning methods. The principal indirectly introduces them to improve their skills in creating fun lessons for children and creating educational media according to their ideas.

3. Principal participative style in Kindergarten Gugus 2 UPTD 1 Johan Pahlawan consists in learning program activities which are early childhood potential development programs to self-actualise, then supervising teachers in the process of child assessment results, evaluating early childhood development programs where this goal will affect the child's development stage. To improve pedagogical indicators, teachers need to have knowledge and insight and be able to create new ideas.

4. The Principal's Delegative Style in Improving Teacher Pedagogical Competence in Kindergarten in Kindergarten Gugus 2 UPTD 1 Johan Pahlawan. Principals use the delegating dimension sparingly.

Acknowledgements

Thank you to the leadership of TK Pembina Johan Pahlawan, who has helped and given permission to provide research data.

REFERENCES

1. Indrawan, I. (2020). *Guru Sebagai Agen Perubahan* [Teachers as Agents of Change]. Lakeisha: Jateng (in Indonesian).

2. Putra, R. S., Murniati, A. R., & Bahrun. (2017). Strategi Peningkatan Mutu Pendidikan pada SMA Negeri 3 Meulaboh Kecamatan Johan Pahlawan Kabupaten Aceh Barat [Strategies for Improving the Quality of Education at SMA Negeri 3 Meulaboh, Johan Pahlawan District, West Aceh Regency]. *Jurnal Administrasi Pendidikan: Program Pascasarjana Unsyiah, 5*(3), 161–166 (in Indonesian).

3. Rahmat, A. S. (2019). *Strategi Belajar Mengajar* [Teaching and Learning Strategy]. Depok: Rajawali Pers (in Indonesian).

4. Sulaiman, M. (2017). *Efektivitas Pelaksanaan Tugas Pengawas Dalam Meningkatkan Mutu Pendidikan Pada Sekolah Dasar Lingkungan Uptd Suku I Disdikpora Kota Banda Aceh* [The Effectiveness of Supervisory Duties in Improving the Quality of Education in Elementary Schools within the Uptd Suku I Disdikpora of Banda Aceh City] (Marter's thesis; Universitas Syiah Kuala). Retrieved from https://etd.unsyiah.ac.id/index.php?p=show_detail&id=31624 (in Indonesian).

5. Sukenda, A. (2019). *Profesi Kependidikan* [Educational Profession]. Semarang: Pilar Nusantara (in Indonesian).

6. Widyoko.(2017). *Evaluasi Program Pembelajran Panduan Praktis Bagi Pendidik dan Calon Pendidik* [Evaluation of Learning Programmes A Practical Guide for Educators and Prospective Educators]. Yogyakarta: Pustaka Pelajar (in Indonesian).

7. Yufrinalis, M. (2021). Pendidikan Profesi Keguruan dan Teknologi Pendidikan [Professional Education and Educational Technology]. Bandung; Media Sains Indonesia (in Indonesian).

8. Malikah, S., Winarti, W., Ayuningsih, F., Nugroho, M. R., Sumardi, S., & Murtiyasa, B. (2022). Manajemen Pembelajaran Matematika pada Kurikulum Merdeka [Maths Learning Management in Merdeka Curriculum]. *Edukati : Jurnal Ilmu Pendidikan, 4*(4), 5912–5918. doi: 10.31004/edukatif.v4i4.3549 (in Indonesian).

9. Gafur, A., & Miskan. (2021). Kepemimpinan Kepala Sekolah Strategi Peningkatan Etos Kerja Guru PAI [Principal Leadership Strategy to Improve Work Ethic of PAI Teachers]. *Jurnal Pendidikan Tambusai, 5*(3), 6488–6494 (in Indonesian).

10. Wagiran. (2019). *Metode Penelitian Pendidikan: Teori dan Implementasinya* [Educational Research Methods: Theory and Implementation]. Yogyakarta: Deepublish (in Indonesian).

11. Marmoah, S., Istiyati, S., Mahfud, H., Supianto, S., & Sukarno, S. (2022). Persepsi Guru terhadap Implementasi Program Sekolah Penggerak di Sekolah Dasar [Teachers' Perceptions of the Implementation of the Mobilising Schools Programme in Primary Schools]. *Dwija Cendekia: Jurnal Riset Pedagogik, 6*(2), 361. doi: 10.20961/jdc.v6i2.65122 (in Indonesian).

12. Safitri, D. (2019). *Guru Profesional* [Professional Teacher]. Riau: Indragiri (in Indonesian).

13. Lince, L. (2022). Implementasi Kurikulum Merdeka untuk Meningkatkan Motivasi Belajar pada Sekolah Menengah Kejuruan Pusat Keunggulan [Implementation of Merdeka Curriculum to Increase Learning Motivation at the Centre of Excellence Vocational High School]. *Prosiding Seminar Nasional Fakultas Tarbiyah Dan Ilmu Keguruan IAIM Sinjai, 1*, 38–49. doi: 10.47435/sentikjar.v1i0.829 (in Indonesian).

14. Usman, M. (2018). *Menjadi Guru Profesional* [Becoming a Professional Teacher]. Bandung: Remaja Rosdakarya (in Indonesian).

School Planning in Improving the Quality of Graduates of SMPN 3 Mataram, Indonesia

Khaerul Rahman Akbar [1], **Asrin** [1], **Lalu Sumardi** [1]

[1] *University of Mataram*
Jl. Majapahit No 62 Mataram, Nusa Tenggara Barat, Indonesia

DOI: 10.22178/pos.89-14

LCC Subject Category: L7-991

Received 26.12.2022
Accepted 29.01.2023
Published online 31.01.2023

Corresponding Author:
Khaerul Rahman Akbar
Khaerulrahmanakbar54@gmail.com

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. This study describes the principal's plan to improve the quality of SMPN 3 Mataram graduates. This research is qualitative. The data collection instruments used were observation, interviews, and documentation. Data analysis was done using data reduction, data presentation, triangulation, and conclusion. We check the validity of the data using the data credibility test, transferability, dependability, and confirmability. The results showed that the principal planning forms were curriculum management, personnel management, and student management planning. Suitable planning activities can improve the quality of graduates at SMPN 3 Mataram.

Keywords: Management; Principal; Quality.

INTRODUCTION

Education is an effort to pass on values and simultaneously become a helper and determinant of humanity in living the life and civilisation of the people [1, 2]. Without education, it can be believed that humans are no different from other creatures who do not receive an education. The education process frees humans from ignorance and poverty, so students need the knowledge to live correctly and be free from poverty [3, 4].

Management is the art/series of activities/efforts carried out by a person or leader in an organisation by involving and utilising all the resources available in the organisation effectively and efficiently to achieve predetermined goals [5].

The ability to empower education personnel in schools must be manifested in providing dynamic direction, coordinating education personnel in tasks, providing rewards for those who excel and punishing those less disciplined in carrying out their duties [5]. In addition, the ability to utilise school resources must manifest in operating and maintaining school facilities and infrastructure, recording the various performances of education personnel and developing professionalism improvement programmes [5]. A school principal must have sufficient managerial skills to manage his school [6].

Principals, as leaders of educational institutions, must be able to carry out their leadership management well [7]. The success of the principal's leadership in its activities is influenced by factors that can support the success of leadership. Therefore a goal will be achieved if there is harmony in the relationship or good interaction between superiors and subordinates, in addition to being influenced by the background of the leader, such as self-motivation to achieve, maturity and flexibility in social relations with human relations attitudes [8, 9]. The indicator of top management is that the principal can invite and influence employees or administrative staff to work together to carry out management functions. This assumption emphasises that the development of administrative personnel will run smoothly if the leader can utilise all administrative personnel in carrying out these management functions, which will be measured based on how much positive change occurs in administrative personnel.

To carry out their role and function as a manager, the principal must have the right strategy to empower education personnel through cooperation that provides opportunities for education personnel to improve their profession and encour-

age the involvement of all education personnel in various activities that support school programs [10, 11, 12]. This is an opportunity for the principal as a leader to fulfil the needs of the education staff. The ability to convey and instil goals is an art that the madrasah head must possess in carrying out his leadership duties. The principle of excellence starts from the assumption that every education personnel needs comfort and must obtain comfort and must obtain personal satisfaction and appreciation.

The principal must carry out his leadership duties well, developing school programs and personnel organisation, empowering education personnel and optimally utilising school resources [13, 14]. The principal is a critical element in driving the school's progress, so it is reasonable if he becomes a party responsible for the quality of education in the education unit he leads. Various factors determine educational institutions' quality, but the principal's role is essential to school progress [15].

One of the schools in the city of Mataram with an outstanding principal is SMPN 3 Mataram, which impacts the achievements of teachers and students. The observations found quality results of student graduates who performed well to teachers' decisions at school. From the information obtained, the quality of student graduates who excel is all the result of teacher guidance at school through a good and responsible learning system. Thus, the 8 National Education Standards have been applied well at the State Junior High School 3 Mataram.

METHOD

This research is qualitative. The place of the study was SMPN 3 Mataram. Researchers conducted research at SMPN 3 Mataram because the school is included in the schools implementing national education standards.

In collecting data, researchers used three data collection techniques, namely, observation, interviews and documentation.

Data analysis procedures in this study are data collection, reduction, presentation, and conclusions and verification.

RESULTS AND DISCUSSION

The principle of SMPN 3 Mataram as a manager reflects leadership. The principal, as a leader, has the authority to form strategic planning to improve the quality of graduates at school. To enhance the quality of graduates carried out at school, the head of SMPN 3 Mataram has the authority to regulate and manage the school he leads. The description of the planning of the principal of SMPN 3 Mataram can be seen from the results of the researchers' interviews with various parties at SMPN 3 Mataram as follows.

Curriculum planning. One of the main tasks of the school is to carry out learning activities based on the applicable curriculum. Thus, understanding the curriculum up to the implementation strategy is very important. Although teachers carry out learning activities in the classroom/laboratory/field, the head of SMPN 3 Mataram is vital, from planning and coordinating implementation to evaluation. The Ministry of National Education has generally prepared and developed the national curriculum at the central level. Therefore, the most important thing at the school level is implementing and adapting the curriculum to learning activities. In addition, schools are also tasked and authorised to develop the curriculum by the needs of the community and the local environment. The current curriculum is the KTSP (Education Unit Level Curriculum) and the 2013 curriculum.

The principal of SMPN 3 Mataram said about the curriculum planning at SMPN 3 Mataram as follows:

In curriculum management, as the principal of the curriculum, I always develop the curriculum by combining the strengths of Science and Technology (IPTEK) and Faith and Piety (IMTAK). So that one of the advantages of SMPN 3 Mataram lies in the science and technology and Imtaq education provided to students.

Based on the interview results above, in this curriculum, the opportunity is open to schools to develop a standard curriculum from the government according to the needs and circumstances of local students. Curriculum management is a cooperative, comprehensive, systemic and systematic curriculum management system to achieve curriculum objectives. In its implementation, curriculum management must be developed in the context of School-Based Management and the Education Unit Level Curriculum. This was

stated by one of the teachers at SMPN 3 Mataram:

Curriculum management at SMPN 3 Mataram is a curriculum that is integrated with students and the environment - general guidance and sending teachers for training and upgrading.

From this statement, the autonomy given to educational institutions or schools in managing the curriculum independently by prioritising the needs and achievement of goals in the vision and mission of educational institutions or schools does not ignore the established national policies. Curriculum management is integral to the education unit-level curriculum and school-based leadership. The scope of curriculum management includes planning, organising, implementing and evaluating the curriculum. At the education unit level, curriculum activities prioritise implementing and releasing the national curriculum (competency standards/essential competencies) with the needs of the region and the conditions of the school concerned so that the curriculum is an integrated curriculum with students and with the environment in which the school is located.

One of the students conveyed the following about SMPN 3 Mataram:

Humans will become fully human if they get an education. Both are undergoing the education process formally and non-formally.

Based on the results of the above interviews on curriculum management at SMPN 3 Mataram, it is understood that the curriculum prioritises implementing and releasing the national curriculum (competency standards / essential competencies) with the needs and conditions of the school by combining the curriculum strengths of Science and Technology and Faith and Piety.

Teachers carry it out to improve the quality of graduates because it makes it easier for teachers to carry out the teaching and learning activities at school to provide guidance or guidance to improve the quality of graduates. Hence, the school takes several steps, as stated by the chairman of the SMPN 3 Mataram committee, as follows:

The curriculum is one component that has a vital role in the system of educational institutions because the curriculum not only formulates the goals that should be achieved to clarify the direction of educational purposes ultimately and will eventually provide experience to individual students. Education and curriculum are two functions to prepare students for a better social life so that the benefits of the curriculum can be felt by the people sheltered in national education institutions.

From this statement, improving the quality of graduates carried out by school principals is a direction. Therefore, curriculum management needs to be carried out in the education process, so that curriculum planning, implementation and evaluation run effectively, efficiently, and optimally in empowering various learning resources, learning experiences, and curriculum components.

Personnel planning. The role of personnel (human resources) in an organisation, including schools, is vital. However, human resources will be optimal if managed properly. The principal of SMPN 3 Mataram has a central role in managing personnel in the school, so the principal needs to understand and implement personnel management properly. This personnel management discusses how educational institutions determine current and future human resource needs. How the top recruits and selects teachers and employees with the best potential abilities in educational institutions.

The principal of SMPN 3 Mataram conveyed that at SMPN 3 Mataram as follows:

As the principal of my personnel field, the principal should always provide training to carry out work effectively and efficiently.

Based on the results of the above interviews on personnel management at SMPN 3 Mataram, it is understood that in personnel management applied in schools, four basic principles are guided or held by the head of SMPN 3 Mataram, namely:

a. In developing the school, the principal considers human resources the most valuable component.

b. Human resources will play an optimal role if appropriately managed, thus supporting the achievement of institutional goals.

c. The school's organisational culture, atmosphere, and the principal's managerial behaviour powerfully influence the achievement of school development goals.

d. The principal's personnel management, in principle, seeks to ensure that every community member (teachers, staff, administration, students, parents and others) can work together and support each other to achieve school goals.

According to one of the teachers, several things need to be considered from what he said:

The principal's personnel management has been very active and good with the school to create an effective and efficient school so; that the principal provides a lot of information about the programmes and problems the school faces, and a synergistic and harmonious relationship grows.

The personnel management implemented at SMPN 3 Mataram aims to create a positive human resource climate. School organisational development seeks to eliminate traditional authoritarian habits and encourage cooperation, decentralised decision-making, openness and deliberation. Organisational development also aims to improve school members' quality of life and their respective competencies.

Management is working with a group of people to achieve organisational goals by implementing the functions of planning, organising, staffing, directing and leading, and controlling. The author [11] states that management develops a group of people's cooperation to achieve goals. One of the students said the following about SMPN 3 Mataram:

Teacher development planning at SMPN MATARAM is carried out in several stages: collecting ideas and ideas."

Based on the interview results above, the implementation of personnel planning in improving teacher discipline, if it can be implemented optimally, the motivation of teachers to excel will be high, so that education in primary schools will automatically develop rapidly. Personnel management includes recruitment, placement, development, reward, merit system, rejuvenation, and a conducive environment. However, due to time constraints, the focus to be developed in this study is on teacher development, teacher incentives (rewards), a merit system, and a conducive environment. Due to time constraints, this study did not develop recruitment, placement and rejuvenation. The focus of teacher discipline to be set in this study is time discipline, discipline towards rules, and discipline towards improving cooperative efforts. as stated by the head of the SMPN 3 Mataram committee as follows:

Stating the development of educational personnel requires inward attention, namely to oneself, especially knowledge that is old or obsolete and implementing outdated tasks. Other experts argue that personnel management includes several activities: personnel recruitment, placement, training and development, rewards, merit systems, rejuvenation and the work environment".

Based on the interview results above, personnel planning is planning, organising, directing, and controlling the procurement, development, compensation, integration, maintenance, and dismissal of employees to implement the goals of the company, individuals, employees, and society. From the experts' statements above, management is a process of controlling a group of people in planning, organising, leading, managing, and innovating to achieve the set goals.

Student planning. The benchmark of the success of an educational process can be seen from the output produced, which is attached to the quality of student graduates produced by the institution. For students who enter an educational institution to master the competencies desired by parents as consumers and improve the quality of educational institutions as producers, student management is needed that is applicable and can meet the demands of students and parents and by the standards of an educational institution. Student management planning is considered very important in improving the quality of graduates in the world of education. This is because educational institutions are small-scale communities that are very influential. In addition, efforts in its implementation must also be made. For example, by structuring student affairs well, orderly and regularly. This is what was conveyed by the head of SMPN 3 Mataram in his interview as follows:

To improve the quality of education graduates at SMPN 3 Mataram, the school always develops students' extracurricular activities according to their talents and interests. The extracurricular activities at SMPN 3 Mataram are scouting, Youth Red Cross, Paskibra, and sports.

The results of the interview above student planning at SMPN 3 Mataram aim to organise all kinds of activities for students so that what is done can support the learning process in educational institutions to run correctly. Implementing student management also serves as a vehicle for students to develop their potential optimally. This is because in its implementation, it is not only learning in the classroom that students can get but there are several other things they can get, such as student organisations that can develop the talents and interests of students. All activi-

ties at SMPN 3 Mataram are ultimately aimed at helping students develop themselves.

This was reinforced by one of the teachers at SMPN 3 Mataram at the same time when explaining as follows:

The role of the principal as a managerial and student planner must be able to improve the quality of the school starting from the personnel that support the improvement of school achievement and quality".

It is understood from the above interviews that efforts will be optimal if students actively seek to develop themselves according to the programmes conducted by the school. Therefore, creating conditions for students to develop themselves optimally is very important. As a leader in the school, the head of SMPN 3 Mataram plays an essential role in creating these conditions. To develop student management in the school, SMPN 3 Mataram constantly improves the extracurricular activities of students at school. Among the programmed activities organised by the school to enhance the learning outcomes of its students is the extracurricular activities programme, both entirely unrelated to the subjects and still related to specific topics. Extracurricular activities are very supportive in developing students' academic and non-academic potential; they can also overcome the backwardness of Islamic religious education subjects at school. Because of religious extracurricular activities, students can understand the teachings of Islam that teachers at school have yet to teach. Therefore, increasing extracurricular activities outside school hours can help students better understand religious education lessons and other subjects. One student conveyed about those at SMPN 3 Mataram as follows:

Primarily, the student affairs section is implemented. Student planning must be prioritised for continuity in the student learning process to produce the desired achievements.

Some of the results of the interviews above are understood that learning activities are activities that can support learning activities for students, including activities that can support students' learning activities in the classroom. Therefore, by increasing extracurricular activities outside of school hours, it can help students to understand religious education lessons and other subjects better, as stated by the head of the SMPN 3 Mataram committee as follows:

Planning in the field of student affairs, which results in being well organised, a problem closely related to the progress of learning achievement is the problem of guidance. The teacher's human resources quality strongly influences improvement in learning achievement. The quality of human resources depends on the level of education of each individual forming the nation. Innovative education has a clear mission that will produce quality output.

Some of the results of the interviews above understand that extracurricular activities are very beneficial for students to increase their knowledge. In addition, SMPN 3 Mataram always tries to improve the competence of teachers at school.

CONCLUSIONS

Based on the results and findings of research conducted in the field, central planning at SMPN 3 Mataram is curriculum management planning, personnel management planning, and student management planning. Suitable planning activities can improve the quality of graduates at SMPN 3 Mataram.

REFERENCES

1. Ali, L. U. (2018). Pengelolaan Pembelajaran IPA Ditinjau Dari Hakikat Sains Pada SMP Di Kabupaten Lombok Timur [Management of Science Learning in Junior High Schools in East Lombok District]. *Prisma Sains : Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram, 6*(2), 103. doi: 10.33394/j-ps.v6i2.1020 (in Indonesian).

2. Ruth, I., & Situmeang, V. O. (2021). Hakikat Filsafat Ilmu dan Pendidikan dalam Kajian Filsafat Ilmu Pengetahuan [The Nature of Philosophy of Science and Education in the Study of Philosophy of Science]. *Jurnal IKRA-ITH Humaniora*, *5*(1) (in Indonesian).

3. Aminullah. (2018). Pendidikan Hak Asasi Manusia [Human Rights Education]. *JUPE*, *3*(3), 5–15 (in Indonesian).

4. Maelani, R., Mustapa, H., & Saifullah, I. (2019). Progressivisme Manusia Indonesia: Kuantitas Sumberdaya Manusia Dalam Perspektif Filsafat Pendidikan [Indonesian Human Progressivism: The Quantity of Human Resources in the Perspective of Philosophy of Education]. *Jurnal Pendidikan UNIGA, 13*(1), 195–214 (in Indonesian).

5. Wildasari, W. (2017). Manajemen Tenaga Pendidik Dan Kependidikan [Management of Educators and Education Personnel]. *Jurnal Sabilarrasyad*, *2*(1), 100–114 (in Indonesian).

6. Usman, H. (2014). Peranan Dan Fungsi Kepala Sekolah/Madrasah [The Role and Function of the School/Madrasah Principal]. *Jurnal PTK Dikmen*, *3*(1) (in Indonesian).

7. Ahmad, M. (2014). Kepemimpinan Visioner Kepala Sekolah, Kepemimpinan Diri Guru dan Sekolah Efektif [Principal Visionary Leadership, Teacher Self-Leadership and Effective Schools]. *JIANA*, *12*(4), 217–228 (in Indonesian).

8. Mukti, N. (2018). Kepemimpinan Visioner Kepala Sekolah [Principal's Visionary Leadership]. *Jurnal Kependidikan, 6*(1), 71–90. doi: 10.24090/jk.v6i1.1697 (in Indonesian).

9. Suriansyah, A., & . A. (2015). Strategi Kepemimpinan Kepala Sekolah, Guru, Orang Tua, Dan Masyarakat Dalam Membentuk Karakter Siswa [Leadership Strategies of Principals, Teachers, Parents, and Communities in Shaping Student Character]. *Jurnal Cakrawala Pendidikan, 2*(2). doi: 10.21831/cp.v2i2.4828 (in Indonesian).

10. Ilham, I. (2021). Kebijakan Kepala Sekolah untuk Meningkatkan Mutu Pendidikan Sekolah Dasar [Principal policies to improve the quality of primary school education]. *Ainara Journal (Jurnal Penelitian Dan PKM Bidang Ilmu Pendidikan), 2*(3), 154–161. doi: 10.54371/ainj.v2i3.70 (in Indonesian).

11. Mulyasa. (2005). *Menjadi Kepala Sekolah Profesional* [Becoming a Professional Principal]. Bandung: Rosda Karya (in Indonesian).

12. Nurfatah, N., & Rahmad, N. (2018). Pelaksanaan Supervisi Oleh Kepala Sekolah Dan Pengawas Sekolah [Implementation of Supervision by School Principals and School Supervisors]. *Jurnal Manajemen, Kepemimpinan, Dan Supervisi Pendidikan, 3*(1). doi: 10.31851/jmksp.v3i1.1585 (in Indonesian).

13. Tarhid, T. (2017). Kepemimpinan Kepala Sekolah dalam Meningkatkan Profesionalisme Guru [Principal Leadership in Improving Teacher Professionalism]. *Jurnal Kependidikan, 5*(2), 141–155. doi: 10.24090/jk.v5i2.1931 (in Indonesian).

14. Yusup, M. (2015). Peran kepala sekolah sebagai pemimpin pembelajaran [The principal's role as a learning leader]. *Manajer Pendidikan*, *9*, 95–100 (in Indonesian).

15. Sanglah, I. N. (2021). Peningkatan Kinerja Guru Melalui Supervisi Kepala Sekolah pada Sekolah Dasar [Improving Teacher Performance through Principal Supervision in Primary Schools]. *Jurnal Pedagogi Dan Pembelajaran, 4*(3), 528. doi: 10.23887/jp2.v4i3.40700 (in Indonesian).

The Influence of Work Discipline on the Quality of Private School Principles in East Lombok, Indonesia

Nasrun [1], **Sudirman** [1], **Asrin** [1]

[1] *University of Mataram*
Jl. Majapahit No 62 Mataram, Nusa Tenggara Barat, Indonesia

DOI: 10.22178/pos.89-13

LCC Subject Category: L7-991

Received 26.12.2022
Accepted 29.01.2023
Published online 31.01.2023

Corresponding Author:
Sudirman
Sudirman_fkip@unram.ac.id

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. This study aims to determine the effect of work discipline on the work quality of private high school principals in East Lombok. The total sample is 45 school principals and uses the census. The method used for data collection is a questionnaire method. Data analysis used is descriptive analysis, prerequisite test and hypothesis testing, which includes linear regression analysis. The research results show that discipline significantly affects the quality of work of private high school principals in East Lombok Regency by 57.5% with p = 0.000. The more discipline increases, the work quality of school principals will also increase.

Keywords: Work Discipline; Work quality; Principal.

INTRODUCTION

The principal is a power or teacher assigned to lead a school with specific competencies and can carry out their duties and roles as a leader or principal [1]. Principals must have innovations and strategies in carrying out their responsibilities and functions and be responsible for their leadership [2]. In school development, principals have a considerable role and task in advancing the school [3]. Principals must be able to create and design various programmes to develop schools by collaborating with various other school parties and other school stakeholders [4].

School development programmes are planned to improve a school's education quality. Educational planning is needed in policy-making both at the national and regional levels. Still, it is also required in policy-making at the school institution level because schools are used as a place to prepare the younger generation for the future. Educational planning has five functions in academic development, namely estimating the end, having the best opportunity among the good, schools can prioritise the needs needed as a measuring tool for school performance [5, 6, 7].

Educational planning plays a vital role in school development, so the potential effect of a school is also influenced by what has been planned in education [8, 9]. The strategic point of macro-scale education planning is driven by the decentralisation of education, which gives schools the flexibility and responsibility to innovate according to the needs of schools or stakeholders.

The position of teachers as professionals aims to implement the national education system and national education goals [10]. The improvement of education, especially at the macro scope, is determined by the operationalisation of management at the school level, where the leading actor or executor in carrying out management is the principal, who is assisted by the entire community. Many problems are found in the form of low student learning achievement, the discipline of both teachers and students, the ability of teachers to manage learning and administrative staff who are slow in serving the needs of students.

These problems prove that the principal's ability to manage and empower staff still needs to improve. Principals must be able to utilise existing resources effectively and maximally to realise and implement educational goals properly. Every principal must have good managerial skills in managing the school they lead.

Based on this description, a study was conducted on principals' leadership in implementing planned programmes to improve schools' quality, especially in developing teacher professionalism and students' academic and non-academic abilities. Therefore, a study was conducted to know the effect of work discipline on the quality of work of private high school principals in East Lombok.

METHOD

This research is a quantitative study. The population of this study were all private high school principals in East Lombok, consisting of 45 people. The total population was used as a research sample, and the sampling technique used a saturated sampling technique (census). The method used for data collection is the questionnaire method. The data analysis used is descriptive, prerequisite tests and hypothesis testing, which includes multiple linear regression analysis to determine the effect of MKKS activities and discipline on the quality of work of private high school principals in East Lombok. Data analysis used the SPSS 20 for Windows programme.

RESULTS AND DISCUSSION

Respondent's perception of discipline. The discipline variable was measured using a questionnaire distributed and filled in by the school principal. The research instrument has a statement of 30 items with five answer options: never, rarely, sometimes, often, and always. Based on these calculations, respondents' perceptions of discipline are determined in Table 1.

Table 1 – Respondents' Perception of Discipline

Score Range	Category	Amount	%
139–150	Very high	27	60
127–138	Tall	8	17
115–126	Currently	7	16
103–114	Low	2	4
90–102	Very low	1	3
Total		45	100

Table 1 shows that most of the respondents' responses to discipline were in the very high category, namely 27 respondents (60%). Respondents who stated that field was very low were one person (3%). The average value of respondents' responses in table 1 is 135.60, which, if interpreted per Table 1, is included in the high category. This means that the more Discipline increases, the Principal's Work Quality will also increase.

Respondents' Perception of Principal's Work Quality. The principal's work quality variable is measured using a questionnaire distributed and filled in by the principal. In Table 2, of the 45 respondents, the highest score was 150, and the lowest was 90. The research instrument has a statement of 30 items with five answer choices: never, rarely, sometimes, often, and always. Based on the calculation, the respondents' perceptions of the Principal's Work Quality are described in Table 2.

Table 2 – Respondents' Perceptions of the Principal's Work Quality

Score Range	Category	Amount	%
139–150	Very high	17	38
127–138	Tall	13	29
115–126	Currently	11	25
103–114	Low	3	4
90–102	Very low	1	4
Total		45	100

Table 2 shows that most of the respondent's responses to the Principal's Work Quality were in the very high category, namely 17 respondents (38%). Respondents who stated that the Principal's Work Quality was very low were one person (4%). The average value of respondents' responses in Table 2 is 130.01, which, if interpreted, is included in the high category. This means that the more Discipline increases, the Principal's Work Quality will also increase.

Significance of Partial Effect of Discipline on Principal's Work Quality. The following single linear regression analysis was used to test the effect of the independent variable (discipline) on the dependent variable (top work quality) of private high schools in the East Lombok Regency. The results of the single linear regression analysis are as follows:

Table 3 – Single Regression Analysis Results

Free Variables	Dependent variable	Constant	Coefficient
Discipline	Principal's Work Quality	46.608	0.718

The single linear regression analysis results in the following equation:

Principal Work Quality = 46.608 + 0.718 Discipline.

The regression equation can be interpreted as

1) The constant in the regression equation is 46.608, which means that if the discipline variable is 0, then the Principal's Work Quality is 46.608;

2) The positive coefficient on the independent variable shows a unidirectional relationship, meaning that if there is an increase in the independent variable, an increase in the dependent variable will follow.

This shows that if there is an increase in discipline, an increase in the Principal's Work Quality will follow.

The t-test or hypothesis testing tests whether the independent variable (Discipline) affects the dependent variable. Before testing, the statistical hypothesis for the t-test is made first as follows:

- H_0: The independent variable does not affect the dependent variable;

- H_a: The independent variable affects the dependent variable;

- If the significance value is more significant than 0.05 (Sig>0.05), it cannot reject H_0;

- If the significance value is smaller than 0.05 (Sig<0.05), then H_0 is rejected.

The t-test results on the regression model are shown in Table 4. The test results decide that the significance value of the Discipline variable is 0.001 (smaller than 0.05), so H_0 is rejected. This means that the discipline variable affects the quality of work of private high school principals in East Lombok Regency.

Table 4 – Discipline variable t-test results on the Quality of School Principal Work

Free Variables	Dependent variable	Significance Value
Discipline	Principal's Work Quality	0.001

The analysis of the coefficient of determination determines the effect of discipline on the quality of work of school principals. The analysis results are shown in Table 5.

Table 5 – Coefficient of Determination of Discipline on the Quality of Work of Principals

Free Variables	Dependent variable	R^2
Discipline	Principal's Work Quality	0.515

Based on the coefficient of determination analysis results, the R^2-value is 0.515. This means that 5.15% of discipline affects the quality of work of private high school principals in East Lombok Regency.

CONCLUSIONS

Based on the study results, it is concluded that discipline significantly affects the Quality of Work of Private High School Principals in East Lombok Regency by 51.5% with p=0.001. The more discipline increases, the work quality of private high school principals in East Lombok Regency will also increase.

REFERENCES

1. Usman, H. (2014). Peranan Dan Fungsi Kepala Sekolah/Madrasah [The Role and Function of the School/Madrasah Principal]. *Jurnal PTK Dikmen*, *3*(1) (in Indonesian).

2. Ahmad, M. (2014). Kepemimpinan Visioner Kepala Sekolah, Kepemimpinan Diri Guru dan Sekolah Efektif [Principal Visionary Leadership, Teacher Self-Leadership and Effective Schools]. *JIANA*, *12*(4), 217–228 (in Indonesian).

3. Susanto, B., & Mattalata. (2018). Pengaruh Kepemimpinan Kepala Sekolah, Iklim Sekolah Dan Kompetensi Guru Terhadap Mutu Pendidikan Di Mts Kabupaten Jeneponto [The Influence of Principal Leadership, School Climate and Teacher Competence on Education Quality in Mts of Jeneponto Regency]. *Journal of Management, 1*(2), 23–39 (in Indonesian).

4. Mulyasa. (2005). *Menjadi Kepala Sekolah Profesional* [Becoming a Professional Principal]. Bandung: Rosda Karya (in Indonesian).

5. Aisyah, A. (2018). Perencanaan dalam pendidikan [Planning in education]. *Adaara: Jurnal Manajemen Pendidikan Islam, 6*(1), 715–731. doi: 10.35673/ajmpi.v7i1.314 (in Indonesian).

6. Mubin, F. (2020). *Pengembangan Model Perencanaan Pendidikan* [Development of an Education Planning Model]. doi: 10.31219/osf.io/5fk6n (in Indonesian).

7. Roijun. (2012). Perencanaan Pendidikan Berbasis Masyarakat [Community-based education planning]. *Educational Management, 1*(2), 2–5 (in Indonesian).

8. Kasmawati. (2019). Implementasi Perencanaan Pendidikan dalam Lembaga Pendidikan Islam [Implementation of Educational Planning in Islamic Education Institutions]. *Jurnal Idaarah, 3*(1), 138–147 (in Indonesian).

9. Suryapermana, N. (2017). Manajemen perencanaan pembelajaran [Learning planning management]. *Tarbawi: Jurnal Keilmuan Manajemen Pendidikan, 3*(2), 183. doi: 10.32678/tarbawi.v3i02.1788 (in Indonesian).

10. Helmi, M. P. (2015). Kompetensi Profesionalisme Guru [Teacher Professionalism Competence]. *Jurnal Pendidikan, 7*(2), 319–336 (in Indonesian).

Servant Leadership School Principles in Improving Teacher Performance at SMPN 7 Mataram, Indonesia

Afjur [1], **Sudirman Willian** [1], **Sudirman** [1]

[1] *University of Mataram*
Jl. Majapahit No 62 Mataram, Nusa Tenggara Barat, Indonesia

DOI: 10.22178/pos.89-12

LCC Subject Category: L7-991

Received 26.12.2022
Accepted 29.01.2023
Published online 31.01.2023

Corresponding Author:
Sudirman
Sudirman_fkip@unram.ac.id

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract This study describes servant leadership in improving teacher performance and building student character at SMPN 7 Mataram. The research approach used is qualitative with the case study method. Interview techniques, observation, and documentation studies were used for data collection. Checking the validity of the data is done by testing credibility, transferability, dependability, and confirmability. The study results show that the servant leadership of school principals can improve teacher performance, especially in discipline, with several efforts, namely supervising, providing motivation and increasing specialisation, activating school MGMP activities, and holding workshops.

Keywords: Servant Leadership; Teacher Performance; Principal.

INTRODUCTION

In an organisation, especially in education, leadership is undoubtedly vital because the progress and decline of an organisation are primarily determined by how a leader's leadership [1]. The ideal type of leadership is when the leader can direct, influence, manage existing resources, and provide work motivation to his subordinates [2]. Leadership is the behaviour of leaders who lead their members to carry out an appropriate activity to achieve predetermined goals. Thus, the personality of a leader is one of the factors that influence the formation of leadership types. One of the new types of leadership that leaders can apply today is servant leadership because its application can be in any kind of organisation, including educational institutions [3].

Greenleaf first introduced servant leadership in 1970, where the concept of servant leadership is a leader who prioritises others. In other words, a person's desire to serve others arises, triggering a desire to lead [4, 5]. The main drive to become a leader is to help and provide services to others as a top priority. Although, in general, people still see leaders and servants as opposites.

The characteristics of servant leadership of school principals are trying to understand, listen, empathise with others, support subordinates regarding decision-making and create a conducive atmosphere to form solid teamwork [6]. With these characteristics, the principal will encourage teachers to emulate the leader in every job so that teachers can carry out their work correctly.

Principals with servant leadership tend to pay attention to organisational members, namely teachers, staff in the school and other stakeholders, through empathy, trust, appreciation for teacher achievements, and trying to take care of and develop their members ethically through good interpersonal relationships. The hope is that by applying servant leadership, principals can build teacher performance in their capacity as educators who provide services to achieve school goals.

Based on preliminary observations made by researchers on 20 January 2022, it was found that SMPN 7 Mataram has an outstanding principal, which impacts teacher and student achievement. And from the results of the preliminary study, it was found that there are SMPN 7 Mataram teachers who are among the outstanding teachers according to the decision of the Head of the NTB DIKBUD Office in 2019, from the information obtained that the principal of SMPN 7 is very attentive to all teachers who are reflected

through providing guidance and workshops to teachers and establishing solid cooperation with teachers. And the principal also entrusts tasks and responsibilities to teachers and staff according to their competence. This indicates that the principal is trying to improve teacher performance.

From the observations made by the researcher, it was found that some senior teachers still needed to improve in the utilisation of technology in the learning process. The lack of preparation regarding learning tools showed the low motivation of teachers works. Thus, SMPN 7 Mataram seems worthy of researching how the principal has performed her duties as a school leader for the past eight years.

METHOD

This research was conducted at SMPN 7 Mataram. This research uses a descriptive qualitative approach with a case study method. In the stage of making conclusions, researchers collected data with several techniques, namely interviews, observations and documentation studies, to informants and then evaluated the results that had been obtained. After that, the researcher conducted a triangulation process to obtain conclusions in the form of a narrative that could be accounted for.

The researcher interviewed the principal, vice principal, and teachers. In the data analysis procedure, researchers use the interactive model of Miles, Huberman, and Saldana: Data Condensation, Data Presentation, and Conclusion Drawing.

RESULTS AND DISCUSSION

Based on the research findings, the application of servant leadership by the principal has a positive impact, namely, the creation of a positive relationship between the principal and the teachers. This positive relationship can be seen in the maintenance of the cooperation mechanism between the components of the school. Creating solid cooperation has an impact on improving teacher performance and a sense of responsibility for their duties. Improved teacher performance can be seen when teachers work more actively in fulfilling their obligations in the learning process and student services. This improvement is influenced by implementing the principal's servant leadership style [7].

In line with that, [8] conveyed that the servant leadership style applied by the principal successfully influenced teacher performance. Principals assist in mediation related to discipline, commitment and motivation to teachers. This significantly affects teacher performance.

Based on the data, the findings show that the principal's servant leadership has an impact on improving teacher performance, especially at the level of discipline. The author [9] said that discipline is an attitude teacher must have because, with high work discipline, it is expected that school expectations can achieve the objectives of education.

Teacher discipline at SMPN 7 Mataram can be seen from the presence of teachers on time, entering and leaving class according to schedule, and the field in delivering material. This can happen because of the critical role of the principal. As a servant leader, the principal provides an excellent example of discipline and does not give sanctions but advice to teachers who lack the discipline to foster awareness of teachers to emulate the principal.

The level of teacher discipline can affect the achievement of school goals. If the level of teacher discipline is high, it will create learning effectiveness to increase student motivation and triumph, which impacts the quality of education. In line with that, the research results by [10] state that the discipline and ability of a teacher to be a role model for students will determine the quality of education.

MGMP (Subject Teacher Consultation) is usually implemented at the sub-district, district or city level. However, the implementation of MGMP like this is less effective and efficient. This is because not all school subject teachers can participate in these activities.

With that, the principal took the initiative to activate the MGMP programme at school to become a forum for subject teachers to discuss. The author [11] said that MGMP is an association forum for subject teachers to communicate with each other, exchange ideas, and share thoughts and experiences to improve teacher performance as classroom learning practitioners. The author [12] also states that implementing MGPM has a strategic role in improving teacher performance.

MGMP is carried out by SMPN 7 Mataram once a month. To create more effective MGMP activities, the principal also occasionally invites external

presenters or coaches, such as from UNRAM. The principal still provides supporting facilities for MGMP activities to smoothly implement activities.

The findings explain that the principal occasionally organises special workshops for teachers in the SMPN 7 Mataram environment. This workshop activity is beneficial for teachers in understanding the duties and responsibilities that will be carried out, which ultimately affects the improvement of teacher performance. According to [13], the workshop's purpose is to quickly obtain the level of performance required in a job and develop existing arrangements to improve achievement. Through workshops, teachers are prepared to accept greater responsibilities in the future.

Teacher involvement in workshop activities can build teacher motivation in carrying out tasks. This is due to the new knowledge gained from workshop activities.

Supervision activities carried out by school principals aim to foster and determine the extent to which teachers carry out the quality of the learning process. With that, the principal can assess the time to which the improvement of teachers performs in carrying out their duties as educators. The author [14] explains that supervision aims to help make it easier for teachers to learn and improve their abilities to implement students' learning goals.

Suitable supervision activities can have an impact on increasing teacher motivation and loyalty at work. The high commitment of teachers in carrying out their duties will increase the productivity of their performance. The goals will be easier to achieve with the increase in teacher performance. Conversely, if the principal needs to supervise correctly, it will increase motivation and teacher productivity.

Therefore, principals must be competent supervisors to assist teachers in carrying out their duties, namely, learning students. With this competence, it is hoped that it can minimise or overcome aspects that can interfere with teachers' tasks, especially in the learning process, of course in a more familial way so that teachers are more motivated to improve their performance which in turn can achieve predetermined educational goals. This aligns with what [15] said: the increasing awareness of teaching staff indicates the principal's success as a supervisor in improving their performance and the growing skills of teaching staff in carrying out their duties.

Based on the research findings, principals conduct supervision with classroom visits to observe teachers' teaching and learning processes. In line with that, [16] said that class visits are a way of coaching teachers by principals to follow the teaching and learning process to obtain the data needed for teacher coaching. This class visit can be carried out with or without prior notice and at the teacher's invitation. Principals can directly contact teachers in classroom learning activities by conducting class visits. However, the principal must work with regular supervision due to other duties or activities outside the school. Therefore, the principal formed a school supervision team to help carry out supervision activities for teachers.

From the results of this supervision, the principal can find the shortcomings of the teachers while carrying out their duties so that later they can be given assistance, namely coaching and follow-up related to their weaknesses so that they can be corrected and maintain their excellence in carrying out their duties and responsibilities. It can be interpreted that supervision with class visits carried out by the principal will not affect teacher performance if there is no follow-up in the form of coaching for teachers.

In addition to being a leader, the principal is expected to motivate teachers at school. The principal must encourage teachers to carry out and complete their duties optimally. Providing motivation regularly can impact teacher performance because teachers will feel cared for and become more enthusiastic about working. Conversely, a lack of motivation from principals towards teachers can lead to low-quality teacher work.

Good work motivation is the key to an organisation's success in achieving its goals. In addition, good motivation creates a solid working relationship and a comfortable and pleasant working atmosphere. High work motivation can be reflected in a person's sense of responsibility for the tasks.

The findings show that principals in motivating teachers provide input and awards or rewards to teachers who excel or can carry out their duties well, support teachers, and provide learning support facilities. In line with this, [11] their research stated that teacher motivation could grow through setting the work atmosphere, physical arrangements, effective rewards, encourage-

ment, discipline, and providing various teaching and learning resources for teachers.

Researchers found that discipline is a top priority implemented by the principal of SMPN 7 Mataram. Authors [17] stated that principals in improving teacher performance could 1) apply discipline, 2) be democratic, 3) and apply good communication. Discipline is the first step to achieving the goals of education and teaching that have been programmed. Education and teaching can run effectively if discipline is really applied in schools. Teachers must carry out the value of discipline well.

The strategy of the principal of SMPN 7 Mataram in improving discipline is by providing positive examples such as being present on time and directing and fostering school members to obey and follow the field according to the provisions. With that, the learning process will be easier to achieve because all school members already know the rules that have been set. One indicator that can be seen that teacher performance has improved is the enforcement of teacher work discipline at school, which includes being present and in class on time, being disciplined in presenting learning materials and leaving class on time according to a predetermined schedule.

In applying the value of discipline, the principal does not pressure teachers who do not obey the rules by giving advice. The principal does this to create communication and a sense of kinship between the principal and the teacher.

CONCLUSIONS

The servant leadership of principals can improve teacher performance, especially in terms of discipline which includes: arriving on time, filling attendance, discipline in delivering material, and leaving class according to schedule. The principal's efforts in improving teacher performance are by:

1) Conducting supervision assisted by the school supervision team;

2) Providing motivation;

3) Improving discipline by not putting pressure on teachers who do not obey the rules.

Principals activate school MGMP activities that can be a forum for subject teachers to discuss and occasionally organise workshops by involving teachers as participants to increase their knowledge and competence.

REFERENCES

1. Suprayitno. (2007). Pemimpin Visioner Dalam Perubahan Organisasional [Visionary Leaders in Organisational Change]. *Jurnal Ekonomi Dan Kewirausahaan*, *7*(2), 115–123 (in Indonesian).

2. Sonedi, S., Sholihah, T., & Dihasbi, D. (2018). Peran Kepemimpinan Kepala Sekolah dalam Meningkatkan Kinerja Guru [The Principal's Leadership Role in Improving Teacher Performance]. *Anterior Jurnal, 18*(1), 13–22. doi: 10.33084/anterior.v18i1.436 (in Indonesian).

3. Ferdinandito, A., & Haryani, T. N. (2021). Gaya Kepemimpinan Servant Leadership Dalam Meningkatkan Kualitas Pelayanan Publik [Servant Leadership Style in Improving the Quality of Public Services]. *Jurnal Mahasiswa Wacana Publik*, *1*(1), 190–202 (in Indonesian).

4. Aji, M., & Palupiningdyah. (2016). Pengaruh *Servant Leadership* Terhadap Kinerja Karyawan Dengan *Burnout* Sebagai Variabel Intervening [The Effect of Servant Leadership on Employee Performance with Burnout as an Intervening Variable]. *Management Analysis Journal*, *5*(3), 178–188 (in Indonesian).

5. Sayoga, A., Kawiana, P., & Astrama, M. (2022). Pengaruh Servant Leadership dan Etos Kerja Terhadap Kinerja Pegawai [The Effect of Servant Leadership and Work Ethic on Employee Performance]. *Widya Amrita: Jurnal Manajemen, Kewirausahaan Dan Pariwisata*, *2*(1), 12–20 (in Indonesian).

6. Yuwono, A. (2021). Pengaruh servant leadership , disiplin kerja, dan kepuasan kerja terhadap kinerja guru [The effect of servant leadership, work discipline, and job satisfaction on teacher performance]. *Jurnal Akuntabilitas Manajemen Pendidikan*, *9*(2), 223–231 (in Indonesian).

7. Rahayu, D. W., & Taufiq, M. (2020). Analisis Pendidikan Karakter Melalui Living Values Education (LVE) Di Sekolah Dasar [Analysing Character Education through Living Values Education (LVE) in Primary Schools]. *Jurnal Inovasi Penelitian, 1*(7), 1305–1312 (in Indonesian).

8. Pratomo, B. D., Arifin, Z. (2020). The Effect of School Principal Servant Leadership of Vocational Schools in Temanggung Regency. *International Journal of Applied Business and International Management, 5*(3), 1–12 (in Indonesian).

9. Natul, M. (2022). Meningkatkan Disiplin Guru Melalui Upaya Supervisi Kehadiran di SMP Negeri 3 Lembor Selatan Kabupaten Manggarai Barat [Improving Teacher Discipline Through Attendance Supervision Efforts at SMP Negeri 3 Lembor Selatan, West Manggarai Regency]. *Jurnal EDUNET, 1*(1), 86–96 (in Indonesian).

10. Setyaningrum, D. G., Supriyanto, A., & Timan, A. (2019). Upaya Peningkatan Disiplin Guru [Efforts to Improve Teacher Discipline]. *Jurnal Manajemen Pendidikan. 10*(1), 20–25 (in Indonesian).

11. Setyadi, B., & Rosalina, V. (2021). Kepemimpinan Kepala Sekolah dalam Meningkatkan Kinerja Guru [Principal Leadership in Improving Teacher Performance]. *Edunesia: Jurnal Ilmiah Pendidikan, 2*(1), 75–84 (in Indonesian).

12. Firman, F. (2016). Peranan MGMP Dalam Meningkatkan Kinerja Guru Mata Pelajaran Pendidikan Agama Islam SMA di Kota Balikpapan [The Role of MGMP in Improving the Performance of Islamic Education Subject Teachers in Senior High Schools in Balikpapan City]. *Jurnal Sains Terapan, 2*(1). doi: 10.32487/jst.v2i1.113 (in Indonesian).

13. Hamdani. (2017). Peningkatan Kinerja Guru dalam Menerapkan Strategi Pembelajaran melalui Workshop Guru Kelas X di SMA Negeri 1 Bireuen [Improving Teacher Performance in Implementing Learning Strategies through Class X Teacher Workshop at SMA Negeri 1 Bireuen]. *Jurnal Serambi PTK, 4*(1), 36–46 (in Indonesian).

14. Wahyudi. (2015). *Kepemimpinan Kepala Sekolah Dalam Organisasi Pembelajar* [Principal Leadership in a Learning Organisation]. Bandung: Alfabeta (in Indonesian).

15. Mulyasa. E. (2015). *Menjadi Kepala Sekolah Profesional dalam Konteks Menyukseskan MBS dan KBK* [Becoming a Professional Principal in the Context of Successful MBS and KBK]. Bandung: Remaja Rosdakarya (in Indonesian).

16. Kolomera, D. (2020). Penerapan Supervisi Akademik Untuk Meningkatkan Kinerja Guru Di TK Stella Maris Nangahure Kecamatan Alok Barat [Implementation of Academic Supervision to Improve Teacher Performance at Stella Maris Nangahure Kindergarten, Alok Barat Sub-district]. *Jurnal Mitra Pendidikan, 4*(6), 379–391 (in Indonesian).

17. Ramadoni, W., Kusmintardjo., & Arifin, I. (2016). Kepemimpinan Kepala Sekolah Dalam Upaya Peningkatan Kinerja Guru (Studi Multi Kasus Di PAUD Islam Sabilillah Dan SDN Tanjungsari 1 Kabupaten Sidoarjo) [Principal Leadership in Efforts to Improve Teacher Performance (Multi Case Study at PAUD Islam Sabilillah and SDN Tanjungsari 1 Sidoarjo Regency)]. *Jurnal Pendidikan, 1*(8), 1500–1505 (in Indonesian).

The Role of Educators and Education Personnel in Increasing the Quality of Education in STKIP Weeetebula, Indonesia

Palli Poti [1], **Joni Rohkmat** [1], **Lalu Muhaimi** [1]

[1] *University of Mataram*
Jl. Majapahit No 62 Mataram, Nusa Tenggara Barat, Indonesia

DOI: 10.22178/pos.89-18

LCC Subject Category: L7-991

Received 26.12.2022
Accepted 29.01.2023
Published online 31.01.2023

Corresponding Author:
Palli Poti
pallipoti@gmail.com

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract The purpose of this study was to analyse the role of educators and education staff in ensuring quality education and the results of the strategy for developing educators and education staff at STKIP Weetebula. This research method is a descriptive qualitative method with a case study technique. Data collection techniques are observation, interviews, and documents. The research results show that the role of educators and education staff in improving the quality of education at STKIP Weetebula is very influential. Teachers at the school successfully follow the rules of the Education Act, according to which educators are professionals whose job is to plan and carry out the learning process, assess learning outcomes, conduct mentoring and training, and conduct research and community service, especially for educators at tertiary institutions.

Keywords: Educator; Education Personnel; Education Quality.

INTRODUCTION

Educators are the main subject in implementing the education and learning process, which is the core of educational activities [1]. Educators, who are teachers, lecturers, learning assistants, tutors or instructors, have an essential role in the learning process [2]. Although currently, the technology that can be utilised in the learning process is developing very quickly, the part of educators cannot be replaced by technology.

The function of educators as educators and teachers for students cannot be replaced by technology [3]. In addition to educators, education personnel (principals, supervisors, library staff, administrative staff) have an essential role in ensuring the quality of education, where education personnel are tasked with carrying out administration, management, development, supervision, and technical services to support the educational process in academic units [4].

In higher education, the standard used is the National Higher Education Standard contained in the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 3 of 2020. The national standards in education include components such as Graduate Competency Standards, Learning Content Standards, Learning Process Standards, Learning Assessment Standards, Lecturer and Education Personnel Standards, Learning Facilities and Infrastructure Standards, Learning Management Standards and Learning Financing Standards. Similarly, the national research and community service standards have eight standards, as in the education standards.

The standards of educators and education personnel need attention from the management of higher education institutions because they are agents of change in the world of education. According to Law No 20 of 2003 concerning the National Education System, educators are professionals tasked with planning and implementing the learning process, assessing learning outcomes, conducting guidance and training, and conducting research and community service.

Specifically, the duties and functions of educators are based on Law No 14 of 2005, namely as learning agents to improve the quality of national education, developers of science, technology and art, and servants to the community. Educators and personnel in the education process play an essential role, especially in managing learning administration for students and educators in a

higher education institution, as a form of the administration itself.

The role of educators towards students in an institution of higher education is still dominant and crucial for the implementation of higher education.

Educators must have academic qualifications and competencies as learning agents, be physically and mentally healthy, and be able to implement national education goals [5]. The educational qualifications referred to above are the minimum level of education that must be met by an educator, as evidenced by a diploma and/or certificate of relevant expertise by applicable laws and regulations.

Education personnel are educational support personnel who carry out administration, management, development, supervision and technical services to support the educational process in academic units within an institution [6]. Cooperation and shared responsibility between educators and education personnel are needed to improve the quality of higher education. So it is not only lecturers who are involved in implementing the tri dharma of teaching [7], but also the involvement of education personnel is needed [8, 9]. Higher education institutions require this to improve the quality of education, including STKIP Weetebula.

Sekolah Tinggi Keguruan dan Ilmu Pendidikan (STKIP) Weetebula (further – University) is a private university under the Nusa Cendana Education Foundation (YAPNUSDA). It is located in Weetebula, Southwest Sumba Regency, East Nusa Tenggara. The presence of the University as an educator-producing institution is the answer to the great need for teachers who meet the academic qualifications as mandated by Law Number 14 of 2005.

The University started its service in 2013. It has operated 7 study programmes: Elementary School Teacher Education, Indonesian Language Education, Mathematics Education, Physics Education, Catholic Religious Education, Science Education, and Pre-school Teacher Education.

The University has a vision of "Making STKIP Weetebula a Higher Education Institution that produces professional teachers who can set an example, build willingness and develop students' creativity". Answering this vision requires hard work from the entire academic community, namely educators, education staff and students. Educators and education personnel must take the proper role to achieve quality education. The part of educators and education personnel will be seen from how the formulation of policies, division and delegation of tasks, programmes and implementation of these roles in achieving institutional goals and quality education according to established national standards.

As an educational institution that produces teachers, the University must guarantee the quality of its education to produce professional educator graduates. To achieve the goals of its vision, the University must have qualified educators and education personnel and contribute to each other according to their duties and responsibilities.

Based on the description of the background of the problem above, researchers are interested in examining how the role of educators and education personnel in improving the quality of education at STKIP Weetebula.

METHOD

The approach used in this research is qualitative. The type in this research is a case study in this approach. Descriptive and in-depth data will be produced in the field, namely about the role of educators and education personnel in improving the quality of education at the University.

The data sources in this research are primary data and secondary data. The preliminary data in this study is the role of educators and education personnel in ensuring the achievement of quality education. Primary data sources are data sources obtained by digging up sources directly from informants, recording the primary data sources through interviews or observations obtained through the combined efforts of seeing, listening, and asking questions received from the primary data sources, namely: the head of the University, the Vice Chairmen, the Head of LPM, Educators and Education Personnel and Students. Secondary data in this study are books, journals, and articles related to the research topic regarding the role of educators and education personnel in improving the quality of education at the University.

Data collection techniques in this study went through several stages: observation, interviews, and documentation. Data analysis is done by organising data, breaking it down into units, synthesising it into patterns, choosing which ones are important and which ones will be studied, and making conclusions that can be told to others.

RESULTS AND DISCUSSION

Based on the results of the analysis conducted by researchers, the general description of the role of educators and education personnel at the University still needs to fulfil the requirements as mandated by Permendikbudristek No. 3 of 2020.

Part 6 of the Permendikbudristek in articles 28 and 29, which regulates the standards of lecturers and education personnel, explains that lecturers must have academic qualifications and teaching competencies, be physically and mentally healthy, and be able to provide education to fulfil the learning outcomes of graduates.

Article 29 paragraph 8 and article 32 paragraph 1 regarding the criteria or requirements for lecturers who teach at higher education institutions must have academic qualifications of at least a Master's degree or an applied Master's degree relevant to the study programme. Likewise, education personnel must have the lowest academic qualifications of graduates of the Diploma 3 programme as stated by a diploma by the capabilities of their primary duties and functions, except administrative personnel who are at least high school graduates or the equivalent.

Judging from the Permendikbudristek above, according to the results of observations and interviews conducted, the role of educators and education personnel in supporting educational activities at STKIP Weetebula shows that it could be more optimal. Several educators (lecturers), especially in the PAUD study programme, must improve their competence by providing scholarships and coaching to improve their quality and professionalism according to their duties and functions.

This is based on what was conveyed by the head of the University:

"The need to improve the quality of human resources for education and education personnel so that the ratio of lecturers to students in PAUD studies programmes can be fulfilled. Then fostering young lecturers and implementing minimum service standards is still lacking. This is due to the unavailability of all standard service documents, and the measurement of service standards has not been running continuously and optimally; (SPMI and AMI) and many others. And these problems are being addressed, and we are improving again to comply with standards that refer to the ministry of education, culture, research and technology regulations to support higher education that is more qualified and able to compete with other universities ".

The same thing was also conveyed by Vice Chair, who said:

"There are several teaching human resources (Lecturers) and education personnel (Staff) at the University that need to be improved, especially the ratio of lecturers to students in the PAUD study programme. For other study programmes, we can say that it is good and according to standards. For this reason, with the development of human resources carried out continuously, this University can compete with other universities that are far more advanced so that they can provide better quality education services".

Supporting the implementation of quality education services at the University is indeed inseparable from the role of educators (Lecturers) and education personnel (Staff) who are professional. The University's quality lecturers and administrative staff must also have competence and ability in their respective fields. This is a significant factor in achieving organisational goals. The existence of a human resource development programme for educators and education personnel can help human resources become more qualified. University provides S2 and S3 scholarships and coaching in terms of participating in training activities held at the national and international levels.

The University needs to continue to make efforts to foster and improve the competence of lecturers regularly. Increasing the competence of lecturers also aims to develop the quality, insight, skills and professionalism of lecturers in a directed and sustainable manner. Similarly, educational staff, as valuable assets that play a significant role in determining the development of the University, also receive guidance through a structured competency improvement programme to encourage the professionalism and quality of academic staff according to their positions.

The quality of lecturers and staff can be improved in various ways. Staff and lecturers are allowed or included in multiple training activities to develop competence. It is also necessary to conduct comparative studies or internships at other universities. There needs to be an awareness to lead and establish themselves in research and service from the lecturers, considering that the three dharmas of higher education are mutually supporting and presupposing (integral). Con-

tinue to encourage lecturers to take further studies. The professionalism of lecturers must always be maintained and improved.

Regarding the dharma of research and service for lecturers, it is recognised that there is a need for innovative research and service. Research and service should also be open to crossing study programmes. To achieve this, lecturers must feel obliged and participate in conducting competitive research and service both on campus and outside on a national and international scale.

The overloaded workload of lecturers is also considered to be one of the obstacles for lecturers to maximise their performance. Therefore, the workload of lecturers in everyday situations (lecturers are enough) needs to be adjusted so that the three dharmas can run in balance. Adding and completing textbooks in the library is also a factor that is very helpful for lecturers in preparing and developing their teaching materials.

Internal factors that must always go hand in hand with external things are the willingness from within oneself to want to change and develop oneself. Another thing that is also felt to be quite influential in performance is the welfare of the lives of lecturers and staff (paying attention to the salaries of lecturers and staff). It is also necessary to pay attention to communication between individuals in the institution. Information flow must be delivered transparently and systematically. Existing policies need to be well socialised, and critical thinking space needs to be opened and held regularly to discuss togetherness, performance, and periodic evaluations. It is necessary to build solid cooperation with partners both domestically and abroad.

In improving the quality of human resources, especially lecturers, the University provides scholarships to lecturers to continue their studies to S2 and S3 levels. In addition, funds for the education of lecturers are also obtained from cooperation with partners who support the University, such as Misereor / KZE, APTIK and Government Institutions such as the Ministry of Religion, Ministry of Education and Culture. The data shows that the University has developed teaching resources and education personnel through scholarships to provide opportunities for educators to continue their education at a higher level. The seriousness of the University in developing teaching and education resources to improve the quality of education in each study programme can be seen in Table 1.

Table 1 – Data on Masters and Doctoral scholarships based on Study Program

No	Study program	Academic year							Total
		15	16	17	18	19	20	21	
1	Elementary School teacher			2		3	2	1	8
2	Indonesian language		2	2				1	5
3	Physics					1	1		2
4.	Mathematics	1			4	1			6
5.	Catholic religion					1		2	3
6.	IPA	1		1				2	4
7.	PAUD	2	3			1			6
Amount		4	5	5	4	7	3	6	34

Table 1 shows the development of the number of educators awarded scholarships from 2015 to 2021.

Several problems need to be addressed to improve the University's human resources. These problems are

1) Status of permanent and non-permanent employees;

2) Some lecturers, even though they have permanent status but do not have NIDN;

3) Some lecturers, even though they have permanent status but do not have functional positions;

4) Many lecturers do not have a doctoral degree;

5) Many lecturers do not have lecturer certification;

6) Many lecturers and education personnel have yet to experience regular career advancement.

The head of the University conveyed the problems mentioned above:

"To overcome the human resources problem, coaching must be done to educators and education personnel at the University and providing scholarships to continue their studies to S2 and S3 levels to increase their competence. Another thing is coaching in the form of training organised at the national and international levels. The activities include scientific writing training, financial training, leadership training and comparative studies.

The development programme of teaching human resources (Lecturers) and education personnel (Staff), such as scholarships, and coaching training activities, is undoubtedly the hope of University institutions to have professional and quality teaching human resources (Lecturers) and education personnel (Staff).

Based on what was conveyed by one of the students at the University said:

"As one of the students studying at the University, the lecturers and staff are very enthusiastic about working. They serve us extraordinarily, sir, so we need something that has no difficulty. Lecturers, when teaching, we as students are rapid to respond and understand the material given, or maybe because now there are many lecturers and staff with S3, S2, and S1. The point is that, in general, the lecturers and staff on our campus are performing well sir. Still, the hope is that in the future, lecturers and staff need to develop their human resources again".

The same expression was also conveyed by student Sumarni Ibrahim saying:

"Yes, in my opinion, at the University so far, the lecturers have played an active role, are disciplined and always encourage us as students. Activities in the classroom during lectures we also feel very fast to respond and understand the material provided. Still, on the other hand, along with technology development, it is good that lecturers and staff must develop their knowledge again".

As a material for improving the quality of the University's student services, the role of educators (Lecturers) at the University will undoubtedly provide student satisfaction with student services in the field of reasoning, the area of interests and talents, the field of career guidance and entrepreneurship, the field of guidance and counselling, the field of scholarships, health, academic fields, proposals, signature and document approval, virtual and face-to-face education, and even the language politeness of lecturers with students.

On average, 55% and 24% of the 554 respondents who filled out the service satisfaction questionnaire stated that they were satisfied with the student services provided, except for satisfaction with education services which stood at 63%. 23% of students expressed dissatisfaction with scholarship services. An average of 17% and 3% of the total respondents were dissatisfied and very dissatisfied with the student services provided, respectively. From the total respondents, it was informed that the student affairs service with the highest level of satisfaction was the reasoning service (63%). In comparison, the service with the highest dissatisfaction was the scholarship service (23%). The satisfaction story is significant, but improving service quality must remain a priority.

In serving, politeness is crucial. Respondents' answers to questionnaires filled out by students showed that 29% and 60% of the 554 respondents stated that they were delighted with the politeness of the language of lecturers/staff in serving.

The role of lecturers and staff must be taken seriously based on what is described. Because the supporting factors, in addition to adequate facilities and infrastructure, also need quality human resources. Therefore, the University once a year provides scholarships to lecturers and education personnel (staff to continue S2 and S3), a coaching programme for lecturers and staff, and training is included at the national and international levels. University students' satisfaction proves that the role of educators (Lecturers) and education personnel (Staff) shows that 29% and 60% of 554 respondents stated that they were delighted and satisfied with the language politeness of lecturers/staff in academic services.

CONCLUSIONS

The role of educators and education personnel in improving the quality of education at STKIP Weetebula is very influential in improving the quality of education; better this is based on Law no 20 of 2003 concerning the national education system article 39, paragraph 2. Educators are professionals tasked with planning and implementing the learning process, assessing learning outcomes, conducting guidance and training, and conducting research and community service, especially for educators at tertiary institutions.

REFERENCES

1. Danumiharja, M. (2014). *Profesi Tenaga Kependidikan* [Education Personnel Profession]. Yogyakarta : Deepublish (in Indonesian).

2. Sopian, A. (2016). Tugas, Peran, Dan Fungsi Guru Dalam Pendidikan [Duties, roles, and functions of teachers in education]. *Raudhah Proud To Be Professionals : Jurnal Tarbiyah Islamiyah, 1*(1), 88–97. doi: 10.48094/raudhah.v1i1.10 (in Indonesian).

3. Helmi, M. P. (2015). Kompetensi Profesionalisme Guru [Teacher Professionalism Competence]. *Jurnal Pendidikan, 7*(2), 319–336 (in Indonesian).

4. Setyawati, P., Erawan, E., & Zulfiani, D. (2020). Peran Pengawas Sekolah Dalam Meningkatkan Mutu Pendidikan Di Sekolah Dasar Negeri 002 Kecamatan Loa Janan Kabupaten Kutai Kartanegara [The Role of School Supervisors in Improving the Quality of Education in State Elementary School 002 Loa Janan Subdistrict, Kutai Kartanegara Regency]. *EJournal Administrasi Negara, 8*(3), 9208–9220 (in Indonesian).

5. Nurziah. (2016). *Kinerja Tenaga Kependidikan pada Perguruan Tinggi Swasta Sekolah Tinggi Ilmu Administrasi Panca Marga Palu* [Performance of Education Personnel at Private Universities, College of Administrative Sciences Panca Marga Palu]. *Jurnal Katalogis, 4*(8), 25–34 (in Indonesian).

6. Salahuddin., Akos, M., & Hermawan, A. (2018). Meningkatkan Mutu Pendidikan Melalui Sumber Daya Manusia Dan Sarana Prasarana Di Mtsn Banjar Selatan 2 Kota Banjarmasin [Improving the Quality of Education Through Human Resources and Infrastructure at Mtsn Banjar Selatan 2 Banjarmasin City]. *Jurnal Ilmu Administrasi Dan Manajemen, 2*(1), 1–13 (in Indonesian).

7. Khairuddin, K. (2019). Program Peningkatan Kualitas Sumber Daya Pendidikan (Dosen) Bagi Perguruan Tinggi [Programme to Improve the Quality of Educational Resources (Lecturers) for Higher Education Institutions]. *Al-Afkar: Jurnal Keislaman & Peradaban, 7*(1), 112–134 (in Indonesian).

8. Arif, Moh. (2013). Manajemen Madrasah Dalam Upaya Peningkatan Mutu Pendidikan Islam [Madrasah Management in Efforts to Improve the Quality of Islamic Education]. *Epistemé: Jurnal Pengembangan Ilmu Keislaman, 8*(2). doi: 10.21274/epis.2013.8.2.415-438 (in Indonesian).

9. Hudan, N. A. (2021). Manajemen Peningkatan Mutu Sekolah/Madrasah [School/Madrasah Quality Improvement Management]. *El Wahdah: Jurnal Pendidikan Dan Pengajaran, 2*(1), 40–52 (in Indonesian).

Management of Elementary School Facilities in Lingsar, West Lombok District, Indonesia Viewed from Planning Aspects

Sulhiyah [1], **Agil Al Idrus** [1], **Lalu Sumardi** [1]

[1] *University of Mataram*
Jl. Majapahit No 62 Mataram, Nusa Tenggara Barat, Indonesia

DOI: 10.22178/pos.89-15

LCC Subject Category: L7-991

Received 16.12.2022
Accepted 28.01.2023
Published online 31.01.2023

Corresponding Author:
Sulhiyah
sulhiyahcita15@gmal.com

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. This study aimed to determine how the management of elementary school facilities in Lingsar, West Lombok Regency, is viewed from a planning perspective. This research is qualitative research with a descriptive method. Data collection was carried out through document analysis, observation and interviews. Data analysis was done through three stages: data reduction, presentation, and conclusion. The study results found that planning is the first process in educational facility management, namely planning needs. This process is critical to avoid the occurrence of an unexpected error.

Keywords: Management; Infrastructure; Planning.

INTRODUCTION

Education is the responsibility of the family, school and society [1, 2]. Every human being will always experience change and development [3]. Educational institutions such as schools must have infrastructure to support the implementation of learning activities [4, 5]. These educational facilities are devices, equipment, and furniture used directly in school learning. At the same time, infrastructure is equipment used indirectly in the learning process at school [6, 7]. Related to this, managing facilities and infrastructure is critical to last a long time and be used for quite a long time. Facilities and infrastructure are the educational resources that are needed and very important to be appropriately managed, and they are an inseparable part of education management [8].

These infrastructure facilities can create comfort and satisfaction, speed up and facilitate work processes, and increase effectiveness [9]. Thus, the need for these facilities and infrastructure is critical. In its management, it must be planned, held, inventoried, maintained, monitored, written off, and reported within a certain period. To be used properly, good maintenance is needed for a long time. The management principle is attaining goals, efficiency, administration, clarity, responsibility and cohesiveness.

The management of infrastructure facilities is one of the school quality standards and school standards for achieving the expected accreditation [10]. These things can be achieved depending on how facilities and infrastructure are managed, such as furniture, educational equipment, educational media, books, consumable materials, land, classrooms, education unit leadership rooms, educator rooms, laboratory rooms, workshop rooms, and unit rooms. Production, canteen rooms, power and service installations, places for sports, places of worship, places for play, and places for recreation.

The condition of infrastructure facilities in 33 elementary schools in the Lingsar sub-district, West Lombok district, has many deficiencies. One example is that many schools do not comply with their accreditation. The criteria for schools that

meet accreditation standards A have complete infrastructure as a supporting capacity in education so that educational goals can be achieved optimally. Optimizing the fulfilment of these infrastructure facilities will contribute to the course of education, which produces suitable activities, is supported by adequate human resources, and can utilize and manage infrastructure facilities, making schools a reference in society.

Good management of facilities and infrastructure will spur an increase in the excellence of each school. Thus, every school with elements of quality human resources can be an indicator of success as a support for increasing the accreditation of a school institution. The condition of the facilities and infrastructure in elementary schools in West Lombok Regency needs attention. Namely, the library room, toilets, and prayer room need attention and maintenance in their management so that there is comfort in their use. This management can be carried out by human resources in the school as assigned by the principal. This will affect the progress of the school. Good management of facilities and infrastructure can indicate increasing the accreditation of each of these schools. Researchers hope that good facilities and infrastructure management for each elementary school in West Lombok Regency can successfully advance the school itself.

METHOD

This research is qualitative or naturalistic. Qualitative research places more emphasis on understanding and meaning, is closely related to specific values, places more emphasis on process than measurement describes, interprets, gives meaning, is not sufficient with mere explanation, and utilizes multiple research methods [11].

This research will be carried out in elementary schools in the Lingsar sub-district, West Lombok district, namely SD Negeri 2 Dasan Geria, SD Negeri 1 Lingsar and SD Negeri 1 Gontoran by focusing on the management of facilities and infrastructure in elementary schools in the Lingsar sub-district, West Lombok district.

The sources of data in this study were informants, namely people who were used to provide information about the situation and conditions of the research background selected as key informants, namely informants based on specific considerations who met the requirements as informants who were very knowledgeable about the aspects of the problem being studied [12]. The informants who were the subjects of the study were school principals, deputy heads, and subject teachers.

Data collection techniques used in this study are observation, interviews, and documentation. Data analysis in research was carried out when data collection took place and after completing data collection within a certain period. The researcher analyzed the interviewees' answers at the time of the interview. If the answers interviewed after being analyzed are unsatisfactory, the researcher will continue the question until a particular stage. Data is obtained that is considered credible. Melis and Humberman suggest that activities in qualitative data analysis are carried out interactively and continuously until completion so that the data is saturated. Activities in data analysis are:

1) Data reduction is a synthetic thinking process requiring high intelligence, breadth, and depth of insight. Meanwhile, reducing data means summarizing, choosing the main things, and focusing on things that are important to look for;

2) Data display (data presentation): data presentation can be done in brief descriptions, charts, relationships between categories, flowcharts and the like. In this study, the validity test of the data used was the degree of trust (credibility) with triangulation of data sources.

RESULTS AND DISCUSSION

The first process in managing educational facilities is planning needs. According to the results of an interview with the Principal of SD Negeri 2 Dasan Geria, planning is a critical process to avoid unexpected mistakes. Careful planning will make an activity carried out properly by predetermined goals and make it easier for us to know the budget that must be provided for carrying out the activity. This was also conveyed by the Head of SD Negeri 1 Gontoran and the Head of SD Negeri Lingsar. Good planning, systematic, careful and thorough will produce something good in the following process, of course, by looking at and analyzing the needs of activities and the priority scale by the availability of funds so that the facilities and infrastructure that will be needed later really suit the needs used in the learning process at school. This was also explained during the interview, he said:

"Strategywhat is done is good, systematic, thorough and careful planning will produce something good in the following process, of course by looking at and analyzing the needs of activities and the scale of priorities by the availability of funds so that the facilities and infrastructure that will be needed later really fit the needs used in the learning process at school.

One must also consider the priority scale needed in the activity process in planning. As stated by the Head of SD Negeri 1 Lingsar. In planning, you must focus on steps such as compiling reasonable steps, preparing solutions if unwanted things happen, identifying problems that will occur later, and seeing benchmarks in preparing goods.

"The planning process must focus on steps such as compiling good steps and preparing solutions if unwanted things happen, focusing on identification problems that will occur later, and looking at the benchmarks in preparing the goods."

We should think about this process in planning so that unwanted things won't happen, or at least we should prepare everything if something unfavourable happens. The same was conveyed in an interview with the Principal of SD Negeri 2 Dasan Geria. Good planning in managing infrastructure at school must consider the number of activities or items needed in the learning process, such as what items are required. Next, we have to look at the process of its activities, making it easier for us to choose and use goods according to their place and condition.

"The planning strategy in managing school infrastructure must consider the number of activities or items needed in the learning process, for example, what items are needed. Next, we have to look at the process of its activities, making it easier for us to choose and use goods according to their place and condition. Good planning at the beginning when managing infrastructure facilities will determine whether it is still suitable for use."

Good planning at the beginning when managing infrastructure facilities will determine whether they are still suitable for use.

Planning is the first process in managing educational facilities. According to the results of an interview with the Principal of SD Negeri 2 Dasan Geria, planning is a critical process to avoid unexpected mistakes. Careful planning will make an activity carried out properly by predetermined goals and make it easier for us to know the budget that must be provided for carrying out the activity. This was also conveyed by the Head of SD Negeri 1 Gontoran and the Head of SD Negeri Lingsar: good planning, systematic,

Planning must also consider the priority scale needed in the activity process. As stated by the Head of SD Negeri 1 Lingsar. In planning, you must focus on steps such as compiling reasonable steps and preparing solutions if unwanted things happen, identifying problems that will occur later, and seeing benchmarks in preparing goods. We should think about this process in planning so that unwanted things won't happen, or at least we should prepare everything if something unfavourable happens. The same was conveyed in an interview with the Principal of SD Negeri 2 Dasan Geria. Good planning in managing school infrastructure must consider the number of activities or items needed in the learning process, such as what items are required. Next, we have to look at the process of its activities, making it easier for us to choose and use goods according to their place and conditions. Good planning at the beginning when managing infrastructure facilities will determine whether they are still suitable for use.

CONCLUSIONS

Planning is the first process carried out in an educational facility management is planning needs. This process is critical to avoid the occurrence of an unexpected error. Careful planning will enable an activity to be carried out properly according to predetermined objectives and make it easier for managers to know the budget that must be provided for carrying out the activity. Proper and careful planning will be based on an analysis of activity needs and a scale of priorities based on the availability of funds.

REFERENCES

1. Subianto, J. (2013). Peran Keluarga, Sekolah, Dan Masyarakat Dalam Pembentukan Karakter Berkualitas [The Role of Family, School, and Community in Quality Character Building]. *Edukasia : Jurnal Penelitian Pendidikan Islam, 8*(2). doi: 10.21043/edukasia.v8i2.757 (in Indonesian).

2. Syamsunardi, S. P., & Syam, N. (2019). *Pendidikan Karakter Keluarga Dan Sekolah* [Family and School Character Education]. N. d. (in Indonesian).

3. Suhada, S. (2020). Problematika, Peranan Dan Fungsi Perencanaan Pendidikan Di Indonesia [Problems, roles and functions of education planning in Indonesia]. *Andragogi: Jurnal Pendidikan Islam Dan Manajemen Pendidikan Islam, 2*(3), 147–162. doi: 10.36671/andragogi.v2i3.119 (in Indonesian).

4. Giri, I. M. A. (2015). Kontribusi sarana pendidikan terhadap kualitas pendidikan di sekolah [The contribution of educational facilities to the quality of education in schools]. *Jurnal Penjaminan Mutu, 1*(1), 46–53 (in Indonesian).

5. Sri Yustikia, N. W. (2019). Pentingnya Sarana Pendidikan Dalam Menunjang Kualitas Pendidikan Di Sekolah [The Importance of Educational Facilities in Supporting the Quality of Education in Schools]. *GUNA WIDYA: JURNAL PENDIDIKAN HINDU, 4*(2), 1. doi: 10.25078/gw.v4i2.1053 (in Indonesian).

6. Jannah, S. N., & Sontani, U. T. (2018). Sarana Dan Prasarana Pembelajaran Sebagai Faktor Determinan Terhadap Motivasi Belajar Siswa [Learning Facilities and Infrastructure as a Determining Factor for Student Learning Motivation]. *Jurnal Pendidikan Manajemen Perkantoran, 3*(1), 210. doi: 10.17509/jpm.v3i1.9457 (in Indonesian).

7. Sutama., Kristiawanto., & Suyatmini. (2016). Kontribusi Sarana Prasarana Pendidikan, Kondisi Lingkungan, Kedisiplinan Kerja Terhadap Kinerja Guru SD [Contribution of Educational Infrastructure, Environmental Conditions, Work Discipline to the Performance of Elementary School Teachers]. *Jurnal Managemen Pendidikan, 11*(2), 91–102 (in Indonesian).

8. Widianstah, A. (2018). Peranan Sumber Daya Pendidikan sebagai Faktor Penentu dalam Manajemen Sistem Pendidikan [The Role of Educational Resources as a Determining Factor in Education System Management]. *Jurnal Humaniora Bina Sarana Informatika, 18*(2), 229–234 (in Indonesian).

9. Emda, A. (2018). Kedudukan Motivasi Belajar Siswa Dalam Pembelajaran [The Position of Student Motivation in Learning]. *Lantanida Journal, 5*(2), 172. doi: 10.22373/lj.v5i2.2838 (in Indonesian).

10. Suhirman, S. (2018). Pengelolaan Sumber Belajar Dalam Meningkatkan Pemahaman Peserta Didik [Management of Learning Resources in Improving Learners' Understanding]. *Al Fitrah: Journal Of Early Childhood Islamic Education, 2*(1), 159. doi: 10.29300/alfitrah.v2i1.1513 (in Indonesian).

11. Sutama. (2012). Metode penelitian Pendidikan [Educational research methods]. Surakarta: Fairuz Media (in Indonesian).

12. Moleong, L. J. (2016). Metodologi Penelitian Kualitataif [Qualitative Research Methodology]. Bandung: Remaja Rosdakarya (in Indonesian).

Measures by Organisations to Counter Challenges in the Use of Information Technology in Protecting Personal and Business Data in Nairobi County, Kenya

Andrew Gitau Kimani [1]

[1] *Kenyatta University*
P. O. Box 43844-00100, Nairobi, Kenya

DOI: 10.22178/pos.89-8

JEL Classification: K40

Received 01.12.2022
Accepted 28.01.2023
Published online 31.01.2023

Corresponding Author:
drew.kimani@gmail.com

© 2023 The Author. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. Globally, most states have adopted new technologies that have seen many process improvements and cost optimisations and enabled them to provide value-added services to their citizens, thereby improving quality of life and achieving rapid growth and development in various sectors of the nation. Kenya is one of the developing countries that has benefited from adopting modern ICT in recent years. Despite government efforts to ensure the successful integration of ICT into various state departments and the private sector to protect and manage data, cases of document loss from individuals and institutions have been on the rise.

This paper examined measures by organisations that could be adopted to counter challenges in using information technology to protect personal and business data in Nairobi County. The study's target population comprised employees from Kenya Revenue Authority and Kenya Data Networks in Nairobi headquarter offices, police officers deployed at NPS offices headquarters and members of the public. The findings established that implementing electronic data management systems in organisations was more appropriate for controlling data loss. In addition, training employees on using the data management system is critical in preventing data loss in an organisation. Creating awareness of electronic data management systems was an effective measure to protect against data loss among organisations. Based on the findings, the paper concludes that strategies that help solve information challenges must be implemented to prevent data loss at personal and organisational levels.

Keywords: Information security challenges; personal and business data; information technology; measures.

INTRODUCTION

Most states have embraced ICT to manage their sensitive and business-critical information in the contemporary business world. The need to protect such a vital component of a nation must be balanced. The author [1] defines data loss as an act of misplacing certain information that was stored in a device. According to [1], this data loss happens when data is physically or logically removed from the organisation, either intentionally or unintentionally. Various studies have established how data loss has become the most significant problem affecting the operations of businesses and organisations, and everyone is doing all they can to overcome this issue.

Most recent studies have applauded the benefits of digital technologies as they have an essential role in preparing individuals to realise current and future needs. States of the West have invested heavily in research and development to bring more advanced technologies. As a result, this has increased the free flow of public information and sharing crucial information among government agencies has been a fundamental component that many citizens use to make informed and timely decisions [2].

Modern technologies have significantly impacted organisational performance and service delivery [3]. These findings were echoed by [4], who found that IT organisations had tactically added

multiple redundant point solutions to overcome individual problems over the years. This amplified the complexities in traditional data centre environments, added risks and increased costs. According to [5], developed countries have taken charge of modern technology and thus are limited to security threats. The study compared many organisations/ businesses in developing countries and established that the majority still needed to catch up in science and technology. Also, [6] noted increasing concern about a gap between the promised vision of modern technologies and current practices in organisations. A recent study argues that most developing countries are far from creating the appropriate conditions to incorporate modern technologies within the existing business ecosystem.

National and international security has been threatened, calling for the new development of databases to urgently save the nations from related attacks. For example, in the United Kingdom (UK), the government introduced a biometric-based national identity card for the UK population in 2006. This intervention aimed at helping security agencies to track down lost documents and identities of citizens through verification of personal data as indicated on the cards. This formed an extensive, effectively centralised database (the National Identity Register) for all UK citizens above 16 years. In addition, the invented register provided an audit trail of an individual's identity registration [7].

In Africa, most countries have focused on areas that would improve the quality of life of their citizens, enhance governance and promote the economy. As a result, technology has caused many transformations in recent years [8]. However, despite the tremendous efforts and resources allocated for development, little progress has been made. Many African countries have yet to come close to developing and transforming their societies to the same standards as developed countries. According to [8], almost three-quarters of Africa are yet to implement electronic document management systems effectively. This has, however, resulted in many cases of identity document theft, loss of identity cards and inaccuracy in filling out data regarding individuals has been rampant.

In Kenya, most operations have embraced modern technologies resulting in increased development in various sectors. Both private and public sectors have integrated innovative tools made available by ICT to increase access to and improve the quality and competitiveness of higher education programs [9]. However, a report published by [10] pointed out that private and public sectors still needed to develop a comprehensive database that could provide adequate and meaningful information to the citizens. The author [11] identified the struggle of most agencies that deal with enormous amounts of data, such as Kenya Data Network (KDN) and Kenya Revenue Authority (KRA), due to failed database systems.

Public members' complaints about document loss without a trace have been reported mainly in Nairobi County, where crime has been on the rise for the last ten years. Most organisations and businesses would prefer to integrate new technologies into their data handling systems, thus causing high data leakage, disappearance and damage. This has affected service delivery, organisational production, employee performance, and national security [11].

As highlighted in the above background review, it is evident that data must be protected from data loss problems to give a competitive edge. Therefore, this paper sought to assess the strategies that could be implemented to improve the use of ICT in protecting personal and organisational data in Nairobi County.

METHODOLOGY

The study adopted the descriptive survey design to enable the researcher to gather information, interpret, summarise, and present for clarity. This research design allowed the researcher to determine information security challenges in the absence of ICT in managing personal data in Nairobi County, Kenya.

The target population included all the employees of Kenya Revenue Authority and Kenya Data Networks in Nairobi headquarters offices, police officers deployed at NPS offices headquarters, and members of the public. The study targeted these institutions because they were known to deal with enormous amounts of data for both personal and business. The police officers were part of this study because of their mandate to help track lost personal and business documents. Lastly, the researcher engaged members of the public to share their experiences of losing business and personal records. The accessible population was 35 employees of Kenya Revenue Authority and 30 employees from Kenya Data Net-

works in Nairobi headquarters offices, 20 police officers deployed at NPS offices headquarters, and 25 members of the public, making a total of 110 participants.

The study employed purposive and simple random sampling techniques to select the required sample from the target population of 110 participants that were drawn from the four groups of the study that is the employees of Kenya Revenue Authority and Kenya Data Networks in Nairobi headquarters offices and police officers deployed at NPS offices headquarters and members of the public.

Primary data was collected using a self-administered structured questionnaire administered to the sampled police officers, employees of Kenya Data Network and Kenya Revenue Authority and members of the public. The interview guide was used to conduct interviews with a key informant from the three organisations, NPS, KRA and KDA, to complement the data collected using the questionnaires. Three critical informants from top-level management of the organisations were interviewed, one from each.

Secondary data was extracted from the police Occurrence Book records. Qualitative data were analysed using thematic analysis, while quantitative data was analysed using descriptive and inferential statistics. Relevant ethical considerations were observed, such as obtaining authorising documents from relevant institutions and ensuring privacy, confidentiality and anonymity measures were in place. Lastly, data collected from the field was scrutinised and processed to ensure proper data management.

RESULTS AND DISCUSSION

The initial sample consisted of 110 participants. However, only 90 questionnaires were filled out and returned, while 20 were not received even after follow-up. The completed and returned questionnaires yielded a response rate of 81.8%.

In addition, the study conducted interviews with key informants from the three organisations, NPS, KRA and KDA, to complement the data collected using the questionnaires.

The study examined the three vital demographic variables of the respondents, which included; gender, age and duration of employment.

The results revealed that male respondents formed the most significant portion of the sample size, 55.6%, while females were 44.4% of the respondents. Regarding age, 48% of the respondents were between 26 and 35.

Lastly, regarding the duration of employment, the study findings established that the majority, 65% of the respondents, had worked in these organisations for 1 to 2 years.

Acquisition of an electronic record-keeping system

Under this subtheme, the study sought whether the sampled organisations had used the electronic record-keeping system to manage the organisational data records. The responses are recorded in Table 1 below.

Table 1 – Acquisition of electronic record-keeping system

Statement	Frequency (N)	%
Yes	85	77
No	20	18
I don't know	5	5
Total	110	100

The study results showed that the majority, 77% of the respondents, agreed to have acquired the electronic record-keeping system to prevent data loss, 18% disagreed, and 5% said they didn't know. The results implied that the electronic record-keeping system had been more convenient than the manual one, as more findings from the interviews indicated that using the electronic record-keeping system had saved many organisations from massive data loss. The first respondent, who was a key informant, reported that,

"Acquisition of electronic record keeping for the organisation is among the best decision we made in the past few years. The system has brought solutions to data loss that a manual had caused. In addition, we can run huge data through the system at once and save it for future reference."

Further, from those reported to have been using an electronic record-keeping system, the study asked the respondents how long they had been using the electronic record-keeping system. The responses are illustrated in Table 2.

Table 2 – Time in years of using the electronic record-keeping system

Number of years	Frequency (N)	%
0-2	30	35
3-5	25	29
5-10	20	24
Above ten years	10	12
Total	85	100

The findings indicated that the majority, 35% of the respondents, said that they had been using an electronic record-keeping system within 0-2 years, 29% said 3-5%, 24% said 5-10 years, and 12% said they had been using the system for more than 10years.

The results implied that most people had yet to embrace the electronic record-keeping system and were still stuck with the manual method. This explains why there was a high number of cases reported of lost documents among the sampled population.

Furthermore, findings from the interviews established that most of the respondents who used the electronic record-keeping system rated its convenience in carrying out their departmental duties very high. This is according to the second respondent, who reported:

"As an organisation dealing with enormous data, we adopt new technologies to prevent data loss. Before moving to digital record-keeping systems, there were high cases of lost documents in the past years. Retrieving files was an uphill task. We had to hire more labour, which was costly and affected service delivery. For the last ten years, we have increased performance as our staff enjoy working with electronic data management systems that quicken the process. We hardly have cases of lost documents or data as all records have been transferred and stored up to our electronic record-keeping systems."

These findings implied that organisations that have been using electronic data management systems for the longest have reduced cases of data loss. Also, these findings support the Innovation Diffusion theory by Rodgers (1995), who stated that specific technology spreads faster in an organisation due to the information they have received about the technology.

Training on electronic data management system

Under this sub-theme, the study asked the respondents whether they had been trained in using electronic data management systems. Their responses are illustrated in Table 3.

Table 3 – Training on electronic data management system

Statement	Frequency (N)	%
1. Have you been trained in electronic data management systems?		
Yes	85	77
No	25	23
2. Which areas have you been trained on?		
Electronic data records keeping	50	45
Storage and maintenance of information	40	41
Paper recording	30	27
Tracking of lost data/documents	20	18
Disposition and transfer of documents/data	30	27
3. How often does your organisation train the staff on electronic data management systems?		
Monthly	20	18
Yearly	60	54
Not scheduled	30	27
4. Does your organisation hire technical expertise in data management to train the staff?		
Yes	50	45
No	60	54
5. After training, would you prefer an electronic data management system to a manual one?		
Yes	85	77
No	10	9
Both	15	14
Total	110	100

The study results established that the majority, 77% of the respondents, had been trained while 23% had not. 45% of respondents had been trained in electronic data management, and 54% reported having been trained yearly.

The majority, 45% of the respondents, said they hired technical expertise to train them on electronic data recording, while 77% reported that they much preferred electronic data management systems.

From the findings, training in electronic data management was seen as a good measure that reduced data loss in an organisation. Organisations and businesses ought to train their employees to make it easier to transition from manual to electronic records management systems. Employees should take more personal responsibility for managing records once electronic data management is implemented in the organisation so that individual and organisational data can be protected from loss.

In addition, as established in the study, variety in skills and expertise results in a quality product. Therefore, the government of Kenya should invest in technical experts to ensure organisations/institutions have adequate digital data management systems.

Develop a digital tracking method for lost data

The researcher asked the respondents whether their organisation had acquired a digital tracking method for lost data/documents. Findings from the interviews indicated that most of the organisations didn't know about a digital tracking method, as reported by the third respondent,

"Every day, I receive reports of citizens who have lost their national Identification Cards, ATM cards and other personal items that require police intervention to help them track the lost items. Unfortunately, tracking down lost items has been an uphill task. This is because we are still using traditional tracking methods. Also, reaching out to persons whose items had been found has been difficult".

Another respondent affirmed the previously reported findings;

"Recently, the organisation has acquired a digital tracking device that has enabled us to control and retrieve lost data/documents within our institution. This has reduced cases of lost data and files. Also, we can connect with our clients who have misplaced their documents and require our intervention."

These findings show the gap due to organisations' need for digital tracking devices. For adequate data protection, the researcher recommends institutions develop a digital tracking system to help trace lost documents and link finders of lost items to owners.

Campaigning or creating awareness on electronic data management systems to protect data loss among organisations

Under this subtheme, the researcher asked the respondents their views on using electronic data management systems to prevent data loss in other organisations across Nairobi County. The findings are indicated in Table 4.

Table 4 – Recommend the use of electronic data management systems

Statement	Frequency (N)	%
Yes	70	64
No	25	23
I don't know	15	14
Total	110	110

Data analysis revealed that most respondents (64%) agreed to recommend using electronic data management systems to protect against data loss, 23% disagreed, and 14% didn't know the response. These results implied that electronic data management systems had impressed many, as few cases of lost documents were reported.

These findings corroborate those of [10], who established that most governmental institutions had been applying electronic document management systems. Thus, data loss cases were low in the Palestinian Pension Authority.

In addition, the researcher asked the respondents whether they had been sensitised on electronic data management systems to prevent data loss in Nairobi County. The results are illustrated in Figure 2.

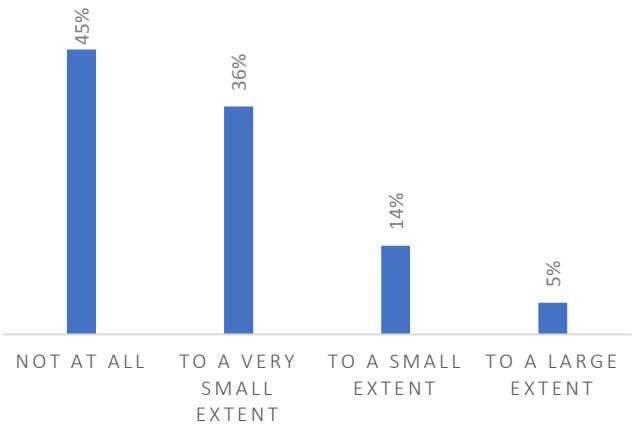


Figure 2 – Sensitisation/creation of awareness on electronic data management

The results showed that almost half of the respondents, 45%, had not been sensitised, 36% reported that the sensitisation was done to a minimal extent, 14% said sensitisation was done to a small area, and 5% said sensitisation was done to a large extent.

Based on the findings, it is clear that a lack of awareness of the importance of proper data management systems contributes to high data loss. The members of the public should be educated on the use of modern technologies. The author [12] demonstrated in the convergence theory that the main aim of technologies was to put together the social world's diverse cultural values and beliefs.

CONCLUSIONS

Based on the findings, the paper concludes that strategies that help solve information challenges must be implemented to prevent data loss at personal and organisational levels. Implementing electronic data management systems in the organisation was found more appropriate to control data loss. Lastly, training employees on the usage of data management systems is critical in working towards preventing data loss in an organisation. Creating awareness of electronic data management systems was an effective measure to protect against data loss among organisations.

REFERENCES

1. Niebla Zatarain, J. M. (2019). Smart cities and personal data: balancing innovation, technology and the law. *Revista Direito, Estado e Sociedade, 54*. doi: 10.17808/des.54.1324

2. Gupta, S. (2018). *Organisational barriers to digital transformation* (Master's thesis). Retrieved from https://www.diva-portal.org/smash/get/diva2:1218220/FULLTEXT01.pdf

3. Kim, S.-B., & Kim, D. (2020). ICT Implementation and Its Effect on Public Organizations: The Case of Digital Customs and Risk Management in Korea. *Sustainability, 12*(8), 3421. doi: 10.3390/su12083421

4. McGowan, K., Vora, P., Homer, M., & Dolan, J. (2018). *Personal data empowerment: restoring power to the people in a digital age*. Retrieved from https://pathwayscommission.bsg.ox.ac.uk/sites/default/files/2018-11/personal_data_empowerment.pdf

5. Roy, C. N., & Viswanathan, T. (2019). Disruptive technologies and its effect on the workforce in banks: a framework of assessment for mitigation. *The Empirical Economic Letters*, *18*(3), 267–281.

6. Kiema, J. (2017). *Effects of ICT Support Services on Revenue Collection by Kenya Revenue Authority* (Master's thesis; University of Nairobi). Retrieved from http://erepository.uonbi.ac.ke/bitstream/handle/11295/103074/Kiema_Effects%20Of%20ICT%20Support%20Services%20On%20Revenue%20Collection%20By%20Kenya%20Revenue%20Authority.pdf?sequence=1

7. Inter-Parliamentary Union. (2009). *Missing persons. A handbook for parliamentarians*. Retrieved from https://www.icrc.org/en/doc/assets/files/other/icrc_002_1117.pdf

8. Ogbomo, E. F. (2011). Issues and challenges in the use of Information Communication Technology (ICTs) in education. *Journal of information and knowledge management*, *2*(1), 1–19.

9. Nyambura, M. (2015). *Influence of adoption of information and communication technology on data management processes in nongovernmental organisations inNakuru county, Kenya* (Master's thesis, University of Nairobi). Retrieved from http://erepository.uonbi.ac.ke/bitstream/handle/11295/90409/Nyambura_Influence%20of%20adoption%20of%20information%20and%20communication%20technology%20on%20data%20management%20processes%20in%20non-governmental%20organizations%20in%20Nakuru%20county%2c%20Kenya.pdf?sequence=3&isAllowed=y

10. Al Shobaki, M. J., Naser, S. S. A., & Kassab, M. K. I. (2017). The Reality of the Application of Electronic DocumentManagement System in Governmental Institutions - an EmpiricalStudy on the

Palestinian Pension Agency. *International Journal of Engineering and Information Systems, 1*(2), 1–14.

11. Kimani, A. G. (2016). *Efficacy of Information Technology in Protecting Personal and Business Data in Nairobi County, Kenya* (Master's thesis; Kenyatta University). Retrieved from https://ir-library.ku.ac.ke/bitstream/handle/123456789/14964/EFFICACY%20OF%20INFORMATION%20TECHNOLOGY%20IN%20PROTECTING.pdf?isAllowed=y&sequence=2
12. Bradley, G. (2010). The Convergence Theory on ICT, Society and Human Beings – towards the Good ICT society. TripleC: Communication, Capitalism & Critique. *Open Access Journal for a Global Sustainable Information Society, 8*(2), 183–192. doi: 10.31269/triplec.v8i2.170

Strengthening the Police Institutional System in Eradicating Narcotics Crime in the North Sumatra Regional Police, Indonesia

Dadang Hartanto [1]

[1] *Muhammadiyah University of North Sumatra*
Jl. Capt. Mukhtar Basri No 3 Medan, 20238, North Sumatra, Indonesia

DOI: 10.22178/pos.89-7

JEL Classification: K40

Received 05.12.2022
Accepted 28.01.2023
Published online 31.01.2023

Corresponding Author:
dadanghartanto@umsu.ac.id

© 2023 The Author. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. This study aimed to analyse the strengthening of the institutional system in eradicating narcotics crimes in the North Sumatra Regional Police. This research was carried out using a qualitative approach involving collecting and analysing non-numeric data. The research unit is under the jurisdiction of the North Sumatra Regional Police.

The results of this study indicate that strengthening the institutional system of the North Sumatra Regional Police is carried out in three ways, namely strengthening the institutional system, strengthening regulations and human resources and strengthening the internal control system. In practice, each procedure is carried out based on applicable laws. There is an abuse of authority by members of the police, so the strengthening of the internal police system must always be improved. Even though Itwasda has carried out internally the monitoring system for narcotics abuse, it still requires external parties, namely the community, to support the implementation of the oversight function of the actions of members of the police.

Keywords: Strengthening; Police Institutional System; Eradicating Narcotics Crime.

INTRODUCTION

The Indonesian National Police is an important institution that can ensure security guarantees in Indonesia [1]. Various criminal problems can always be handled even though sometimes it seems slow by society [2]. Efforts to achieve satisfaction with Polri's performance are not easy to accomplish because various strategies and approaches to the community are needed [3]. Moreover, many Polri members in multiple regions have recently been involved in criminal cases ranging from abuse, domestic violence, abuse of authority, the arrogance by beating civilians, and shootings to using illegal drugs (narcotics).

If the public's trust in the Polri institution in various regions increases, this reflects the community's satisfaction with Polri's performance. One of the Polri institutions in the area that has gained public trust is the North Sumatra Regional Police. Referring to the data released by the ETOS Institute, it is stated that the high level of respondents' knowledge of police performance in their respective regions, at 87%, indicates a relatively high level of information need for police institutions, which is carried out through social media and electronic print media. The North Sumatra Regional Police has the highest rating in almost all aspects of performance, including the level of handling crime, the level of public service, and the level of human resource improvement.

However, this achievement cannot fully guarantee that narcotics crime will not occur again. Therefore it is necessary to continue efforts to maintain this achievement, especially in dealing with significant cases such as mushrooming drugs in the regions.

The causes of narcotics crimes do not only come from the community. There is an abuse of authority by members of the National Police, as recently happened at the Medan Polrstabes. The police who become perpetrators of abuse are contrary to the objectives of the law of the Indonesian National Police.

Narcotics crime is getting more terrible and terrible. Even though there are regulations that regulate these crimes and which punish them with the death penalty, these crimes are still being

committed and are ongoing [4]. It is known that the narcotics problem is a problem that attracts the attention of many groups, both the community and the government [5]. In response to these problems, it is necessary to strengthen the system for eradicating narcotics crimes by optimising and increasing understanding in the field of law related to the rules and regulations that apply within the Police and the Regional Police of North Sumatra.

METHODS

This research was carried out using a qualitative approach involving collecting and analysing non-numeric data. This type of research is used to gather in-depth insights about a problem or generate new ideas for study [6]. The research unit is the jurisdiction of the North Sumatra Regional Police and the ranks of the police. Primary data was obtained directly from informants at the research location. Interviews were conducted To complete the data and information in the research. Determining the informants in this study was carried out by directly selecting the informants using the purposive sampling technique. The informants in this study included the Directorate of Narcotics, the Head of the Criminal Investigation Unit, the Drug Unit, and Community Leaders.

RESULTS AND DISCUSSION

Disclosure of narcotics crimes is part of the success of the North Sumatra Regional Police in strengthening the institutional system. This can be seen in Table 1.

Table 1 – Disclosure of narcotics crimes of the North Sumatra Regional Police in 2019-2021

No	Unity	Completion Percentage		
		2019	2020	February 2021
1	Medan Police	86	102	87
2	High Cliff Police	63	92	51
3	Deli Serdang Police	90	105	66
4	Binjai Police	94	104	89
5	Langkat Police	86	114	61
6	Simalungun Police	98	97	79
7	Ashan Police	103	103	89
8	Labuan Batu	96	113	31
	Police			
9	Central Tapanuli Police	97	102	69
10	North Tapnuli Police	105	152	120
11	South Tapanuli Police	95	113	62
12	Medina Police	104	88	94
13	Karo Land Police	86	122	108
14	Dairy Police	100	119	80
15	Nias Police	125	84	80
16	Harbor Police. Belawan	95	93	74
17	Sergei Police	85	72	104
18	Polres p. Siantar	116	117	135
19	Tanjung Balai Police	76	109	55
20	Sibolga Police	94	94	33
21	Polres P. Sidempuan	128	84	83
22	Toba Police	77	108	0
23	Samosir Police	-	110	0
24	Humbahas Police	95	91	100
25	South Nias Police	74	91	60
26	Polres Pak – Pak Barat	86	100	67
27	Coal Police	92	99	76
28	Palas Police	91	79	50
Amount		91	99	75

Table 1 shows fluctuations in the settlement of narcotics crimes every year. In 2019 the average number of settlements for narcotics crimes was 91%, while in 2020, it was 99%. This means that, in practice, the North Sumatra Regional Police can improve performance by reducing the crime rate of narcotics crimes. Even in February 2021, the completion percentage of narcotics cases reached 75%. Thus, the various efforts that the North Sumatra Regional Police have made can encourage members' performance in solving narcotics problems by strengthening the institutional system, strengthening regulations and resources and strengthening the monitoring system.

Efforts to strengthen the system within the Polri institution continue to be carried out continuous-

ly to build public trust to have high integrity within the police institution and its supervision. If this is not carried out properly, law enforcers can become vulnerable to breaking the law and beyond their authority. Police reform interventions, such as more robust anti-narcotics measures and human rights-centred training for police officers, are urgently needed. In addition, long-term efforts are needed to establish a framework for police oversight and accountability to strengthen integrity within the North Sumatra Regional Police system and promote the integrity and prevention of narcotics crime.

The North Sumatra Regional Police first strengthened the system by building an ethical police force, using various legal, administrative and educational approaches to overcome narcotics crimes. The series of actions thus became an important initiative in strengthening the bond between law enforcement agencies and the community. Therefore, when designing a strategy to build the integrity of state law enforcement, a variety of diagnostic information must be used.

Second, must be the placement of human resources according to their competence. The absence of specific tasks means that every Polri personnel must always be ready to be placed anywhere [7]. But expected for all personnel of North Sumatra Regional Police is an opportunity to obtain a placement that is by their competence and evenly distributed. Equal distribution of personnel throughout the unit of Regional Police has yet to be maximally implemented. If the distribution of personnel is evenly distributed, the teams can carry out their duties optimally, and overall operational readiness improves because there are sufficient personnel [8].

The efforts made in the distribution and distribution of this personnel in the North Sumatra Regional Police consist of the development of an Assessment Center to ensure the quality of competence. The goal is to explore the competency level of a police officer through a series of tests (multiple tests), usually also carried out by more than one rater (rater). Based on several empirical research, assessment centres are known to have high validity in predicting individual competency levels. This assessment method is only used to test soft competency types, often referred to as managerial competencies (for example, leadership competencies, communication skills, problem-solving skills, team skills, and the like).

Third, information and communication technology-based service facilities that are affordable for the community provide fast information and improve the quality of the community's life through various applications. Community service communication channels are carried out through unique portals, applications, or social media such as Twitter, Instagram, Facebook, and police applications Go regiment, SIM online, SKCK online, SP2HP online, SPKT online, Call Center, Cybertrops, ATCS and E-Office and others. For regulations to be reflected in police behaviour, they must permeate police culture through training measures, procedural innovation, public oversight, and inspection mechanisms.

The use of an early intervention system aims to prevent the problem from recurring or increasing. The need for a proactive and evidence-based approach due to the value of information and the power possessed by the police. Officers are exposed to organised crime as part of their job, making them especially vulnerable to manipulation.

One of the regulations carried out by the Medan North Sumatra Regional Police is to apply high discipline and ethics in carrying out their duties. In fact, with high domain and ethics, police officers are increasingly trusted by the public. In building police discipline and responsibility, the North Sumatra Regional Police have carried out tasks with quite heavy targets. However, this cannot be separated from the guidance and direction of the North Sumatra Regional Police Leaders so that this competence becomes a benchmark for the success of the police as public servants.

Apart from that, it is essential to simultaneously increase the competence of human resources for members of the police force. Member resources have a very decisive role in the quality of work of members of the police. The North Sumatra Regional Police work unit adopts competency-based human resource development that has been developed in the United States. This approach has the principle that humans and work are in one unit, and observations are made continuously on the characteristics of successful humans in that environment. This step was taken because using a psychometric approach seems less suitable to predict the ability of a police officer to work. Members of the police with exemplary academic achievement and psychological test results do not necessarily give superior per-

formance. For this reason, a competency-based HR development program is still needed through placement, succession, performance appraisal, education and training, and compensation programs.

Likewise, the provision of motivation, development of skills and knowledge of police officers, and competency development are conditions for achieving the strategic business objectives of a Police Agency. To improve the organisation's image, every organisation must create an organisational competitive advantage to be equal or even superior to other organisations, including the idea of the National Police. Two components recognised and proven to create an organisation's competitive advantage are the commitment and competence of the members involved. This component is called Intellectual Capital [9].

It is recognised that high commitment can awaken members' emotional closeness to the organisation. In this way, the image of the National Police will increase and become the public's trust. The police are partners and protectors of the community. A high level of commitment will result in higher loyalty, foster cooperation and increase self-esteem and a greater sense of belonging, authority, psychological involvement, and feel an integral whole with the organisation.

Meanwhile, a police institution with many talented members with high competence but without strong commitment is just a group of great people who will most likely only do something if they have responsibility. On the other hand, the strengthening of regulations is carried out by establishing a civil culture. The complexity of the problems faced by the North Sumatra Regional Police towards civil police in a modern and democratic society is carried out with professional capabilities by providing conceptual and theoretical knowledge regarding various public service issues. It is increasingly clear that the need for police knowledge must be part of the professional development of a police officer who is expected to identify and understand every problem encountered and a rational solution. The civilian police respect civil rights; a democratic society needs a civilian police force capable of acting as civil servants. These values have been formulated in Human Rights, which are guaranteed as the guardian of civilian values.

The civilian police's main characteristics are cultural attitudes that are polite, courteous, friendly, non-violent, and prioritising persuasion. It's diametrically far from military characteristics, in line with the definition raised in international legal agreements, which places the position of the police as a force that is not involved in the war. In contrast, the military is designed to fight. The function of the police is aimed to create internal security, the order in society, service and assistance to the community, law enforcement and community policing. And the quality of the civilian police is measured by its ability to distance itself from the military character and draw closer to the community [9].

Civilian police are more represented by service rather than force. Many must undergo deconstruction before reaching service, including changing the mentality and characteristics of police officers in the ranks of the North Sumatra Regional Police. The current vision of the police is not just as law enforcement officers but as police who are capable of being predictive, responsible, transparent and fair (Presisi), who are always close to with the community, law enforcers who are professional and uphold the rule of law and HAM.

In anticipating internal violations related to narcotics abuse, the North Sumatra Regional Police has strengthened the monitoring system for members. This is part of revamping the organisation's body to show the public that Polri is not "allergic" to criticism and suggestions from the crowd. This action was carried out in line with the importance of police ethics in determining its performance in carrying out its duties as law enforcers.

Internal control of narcotics abuse by the North Sumatra Regional Police is in the form of supervising abuse of authority and violations to maintain public security and order, enforce the law, and provide protection, protection and service to the community in the framework of maintaining internal security carried out by the Indonesian National Police. Because police supervision is carried out in stages, in terms of the relationship of authority, police supervision is vertical and horizontal [10].

Vertical supervision is supervision by superior organisations against organisations based on a lower position hierarchy. At the same time, horizontal supervision is carried out by institutions or other fields that are at the same level or hierarchy level [10]. Based on Article 7 of Presidential Decree No 5 of 2017, Itwasda carries out supervisory duties and authorities in every area

within the Polda structurally and functionally at regional level units. Itwasda is under Kapolda.

Several factors are driving the performance of the Itwasda oversight function on actions taken by Polda members. These consist of elements that enable Itwasda to carry out its authority and factors that help Itwasda carry out its functions. These factors include, first, good coordination/cooperation between functional units. As has been explained, the implementation of the oversight function within the Regional Police is not only carried out by Itwasda. Other available teams play a role in carrying out the supervisory process, mainly the General Criminal Investigation Directorate (Ditreskrimum), the Special Criminal Research Directorate (Ditreskrimsus), the Narcotics Research Directorate (Diresnarkoba), and the Professional and Security Division (Bidpropam) within the Regional Police. The coordination carried out by the functional units related to Itwasda went well, so miscommunication between available teams [11].

If the member being complained about is suspected of being a criminal act, then what is used is the criminal procedural law which is also used to deal with alleged criminal acts committed by the general public. This has the consequence of prolonging the process, which should have been carried out quickly, especially considering the role of Polri members who are law enforcement officers. Not only that, repressive efforts were made by the North Sumatra Regional Police to eradicate narcotics,

Given the broad reach of illicit drug trafficking, it is certainly hoped that the participation of the community, including NGOs and other social institutions, will assist officials in connection with this crime [12]. The community must also participate. At least report everything related to activities related to drug abuse in their environment. It must be not only external to the police, the monitoring system, considering that the problem of drug abuse is complex. In general, narcotics crime is caused by three factors, namely individual factors, environmental/social factors and availability factors. This shows that effective drug abuse prevention requires an integrated and comprehensive approach. Any approach is taken without considering these three factors will be redundant. Therefore the role of all related sectors in drug prevention is vital.

CONCLUSIONS

So complex is the problem of narcotics that it has penetrated the police. This phenomenon is part of an essential correction by the leadership of the National Police institution at the regional and central levels. Abuse of authority and violations are two things that can trigger the emergence of narcotics crimes. Therefore, to fortify attacks on narcotics crimes that have undermined members of the police and the community, efforts must be made to strengthen the institutional system, regulations and the police's internal and external control systems.

REFERENCES

1. Azhar, A., Fikri, N. S., Siregar, V. A., & Apriyanto, M. (2021). Pencegahan, Pemberantasan, Penyalahgunaan Dan Peredaran Gelap Narkoba (P4gn) Pada Pesantren [Prevention, Eradication, Misuse and Trafficking of Drugs (P4gn) in Pesantren]. *Jurnal Inovasi Penelitian, 1*(11), 2463–2467 (in Indonesian).

2. Siburian, A., Naibaho, R., & Siburian K. (2021). Peranan Kepolisian Dalam Menanggulangi Penyalahgunaan Narkotika Yang Dilakukan Oleh Anak Di Bawah Umur (Studi Di Kepolisian Resort Simalungun) [The Role of the Police in Overcoming Narcotics Abuse Committed by Minors (Study at the Simalungun Resort Police)]. *PATIK, 10*(1), 25–37 (in Indonesian).

3. Fransiska, N. E. (2011). Bahaya Penyalahgunaan Narkoba Serta Usaha Pencegahan Dan Penanggulangannya (Suatu Tinjauan Teoritis) [The Dangers of Drug Abuse and Its Prevention and Countermeasure (A Theoretical Review)]. Jurnal Hukum, 25(1), 439–452 (in Indonesian).

4. Lukman, A. G., Alifah, A. P., Divarianti, A., & Humaedi, S. (2021). Kasus Narkoba Di Indonesia Dan Upaya Pencegahannya Di Kalangan Remaja [Drug Cases in Indonesia and Prevention Efforts among Teenagers]. *Jurnal Penelitian dan Pengabdian Kepada Masyarakat, 2*(3), 405–417 (in Indonesian).

5. Yani, I. E., & Nursanthy, R. T. (2021). Penegakan Hukum Tindak Pidana Penyalahgunaan Narkotika Yang Dilakukan Oleh Pihak Berwajib (Kepolisian Maupun Anggota Militer) [Law Enforcement of Criminal Acts of Narcotics Abuse Committed by the Authorities (Police and Military Members)]. *The Juris, 5*(2), 177–184 (in Indonesian).

6. Creswell, J. W. (2010). *Research design: qualitative, quantitative, and approaches mixed*. Yogyakarta: Student Library.

7. Pradityo, R., & Kurniawan, R. (2021). Peran Kepolisian Dalam Mengungkap Tindak Pidana Narkotika Yang Dilakukan Anggota Kepolisian (Studi Di Wilayah Hukum Polda Bengkulu) [The Role of the Police in Uncovering Narcotics Offenses by Members of the Police (Study in Bengkulu Police Jurisdiction]. *Indonesian Journal Of Police Studies, 5*, 1–16 (in Indonesian).

8. Hartanto, W. (2017). Penegakan Hukum Terhadap Kejahatan Narkotika Dan Obat-Obat Terlarang Dalam Era Perdagangan Bebas Internasional Yang Berdampak Pada Keamanan Dan Kedaulatan Negara [The Law Enforcement Against Narcotic And Drug Crimes Impacting On Security And State Sovereignty In The Era Of International Free Trade]. *Journal of Indonesian Legislation, 14*(1), 1–16 (in Indonesian).

9. Ulrich D. (1998). A new mandate for human resources. *Harvard business review*, *76*(1), 124–134.

10. Sadjijono. (2008). *Etika Profesi Hukum: Suatu Telah Filosofis terhadap Konsep dan Implementasi Kode Etik Profesi POLRI* [Legal Professional Ethics: A Philosophical Study of the Concept and Implementation of the POLRI Code of Professional Ethics]. Yogyakarta: Laksbang Mediatama (in Indonesian).

11. Trisusilowaty, D., Lumbanraja, A. D., & Suteki, S. (2019). Fungsi Pengawasan Oleh Inspektorat Pengawasan Daerah Berbasis Pengaduan Masyarakat Dalam Perspektif Hukum Progresif [The Supervisory Function by the Regional Supervisory Inspectorate Based on Public Complaints in the Perspective of Progressive Law]. *Law Reform, 15*(1), 25. doi: 10.14710/lr.v15i1.23353 (in Indonesian).

12. Rachman, A. I., & Kusriyah, S. (2020). Law Enforcement Of Narcotics Laws. *Law Development Journal, 2*(2), 139. doi: 10.30659/ldj.2.2.139-145

Juridical Study of Arrangements for Authentic Deeds through Cyber Notary: Comparative Study with Japan

Noval Dwi Kurnia [1], **Muhammad Sood** [1], **Hirsanuddin** [1]

[1] *University of Mataram*
Jl. Majapahit No 62 Mataram, Nusa Tenggara Barat, Indonesia

DOI: 10.22178/pos.89-16

JEL Classification: K40

Received 26.12.2022
Accepted 29.01.2023
Published online 31.01.2023

Corresponding Author:
Noval Dwi Kurnia
novaldwikurnia12@gmail.com

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract This study aims to analyze cyber notary regulations in Indonesia and Japan, analyze the similarities and differences in cyber notary regulations in Indonesia and Japan and explore what benefits can be drawn from cyber notary regulations in Indonesia by using the theory of legal certainty, comparative law, legal system, and the idea of legal authority. The legal materials in this research are primary and secondary legal materials using normative research methods. According to the study, the concept of a cyber notary in Indonesia is still conceptual. At the same time, in Japan, the cyber-notary is regulated in law No 74 of 2011 concerning the Notary Act, which has differences related to Notary Organizations, procedures for carrying out cyber-notary, Certification Authority/Certified Service Providers, and witnesses.

Keywords: cyber-notary; Authentic deed; Notaryact.

INTRODUCTION

The development and progress of technology in the world have increased so rapidly that it has had various significant impacts, where people have received multiple conveniences and increased the implementation of their daily activities and activities in many fields, one of which is marked by the birth of the internet as a carrier of the world's economic system to a new chapter more popular with the term digital economics [1].

Today's electronic transactions have become part of people's lives domestically and across countries [2]. Electronic transactions are a separate trend in business interests. Its development has changed the types of transactions that exist. In ordinary transactions, there is a change in transactions from physical (money) to something tangible (paper), while in electronic transactions, transactions from physical to electronic produce electronic certificates. Electronic transactions are carried out by not bringing the parties face to face, as in doing a deed, which generally occurs [3].

Developments in information technology also affect notaries in carrying out their duties and authority as public officials. Legal technology has been widely applied in carrying out the responsibilities and positions of a Notary/PPAT, for example, the Fiduciary Registration System through online AHU, application for letters of authorization for the establishment of legal entities and business entities through online SABH (Legal Entity Administration System) and online SABU (Business Entity Administration System) to installation Electronic Mortgage.

In connection with the increasing prevalence of electronic transactions in Indonesia, of course, the authority of a Notary in issuing certificates for transactions carried out electronically is a breath of fresh air for the perpetrators of these transactions. Because with this authority, the perpetrators of electronic commerce can certify their legal actions to have a certificate that can be used as evidence that a transaction has occurred electronically. If the notary's authority to certify transactions carried out electronically can be carried out, fraudulent acts that often happen in society can be avoided.

The authority of a Notary to certify transactions carried out electronically (cyber-notary) has created a polemic in society, especially among Nota-

ries. In Indonesia, implementing cyber-notary is still being debated and is felt as just a discourse, yet to be a necessity. Even though technology allows the role of a notary online and remotely, this cannot be done legally because there are still many other problems, such as authentication problems [4]. The term cyber-notary itself or electronic notary is two different concepts. The term electronic notary, better known as e-notary, was popularized by legal experts from countries that inherited the Continental European tradition. In contrast, the term cyber-notary was popularized by jurists who inherited the common law tradition [2].

In addition to Law No 2 of 2014 concerning the Position of Notary Public and Law No 19 of 2016 concerning Amendments to Law No 11 of 2008 concerning Information and Electronic Transactions, provisions in other laws that support opening up opportunities for implementing cyber-notary are in Article 77, paragraph 1 and paragraph 4 of law No 40 of 2007 concerning Limited Liability Companies (LLC). It states that, in addition to holding a General Meeting of Shareholders (GMS) as referred to in Article 76, it can also be held via teleconference media, video conferencing, or electronic media facilities others that allow all GMS participants to see and hear each other directly and participate in the meeting.

Even though some regulations and laws open up vast opportunities for implementing cyber-notary in carrying out the duties and powers of a notary, it must be recognized that shifting roles towards the era of cyber-notary takes work. This is due to several legal obstacles faced by notaries in their application. The problem concerns the validity or legality and strength of proof of electronic documents as a product of a cyber-notary. The issue of legitimacy or the legality aspect in the application of cyber-notary referred to is contained in the provisions of Article 1 point 7 of law No 2 of 2014 Concerning the Position of Notary Public, which states that a Notarial Deed is an authentic deed drawn up by or before a Notary by the form and procedure stipulated in this law. Then in Article 16, paragraph 1, letter m states in carrying out his position, the notary is obliged to read the deed before he appeared in the presence of at least two witnesses, or four witnesses, specifically for making a will underhanded, and signed at that time by the apparel, witness.

Where this is not by way of making a Notary deed an authentic deed which has been regulated in the provisions of Article 16, paragraph 1(m) of law No 2 of 2014, explaining that a Notary is obliged to read the deed before the appeared in the presence of two people witnesses, it means that the appearers must have a physical meeting before the notary in person (face to face). Meanwhile, as we know, cyber-notary here, the position of the apparel is not directly before the notary but through electronic means such as teleconference or video calls.

Based on the background stated above, the authors are interested in researching how cyber-notary regulations are in Indonesia and Japan and the similarities and differences between cyber-notary rules in Indonesia.

METHODS

The type of research used by the authors in this study is normative legal research. Normative legal research is legal research that uses normative legal case studies in the form of legal behaviour products. The survey's main subject is a law conceptualized as a norm or rule that applies in society and becomes a reference for everyone's behaviour. In addition, it is said to be normative research because, in this study, the author refers to the literature and legislation relating to the problem that will be investigated to get answers to the above issues.

The research approach used to answer the problems in this study is

a) Statutory Approach. This approach studies and analyses all laws and regulations related to the studied legal issues [5]. In this study, the authors analyzed laws and regulations regarding cyber-notaries in Indonesia and Japan.

b) Conceptual approach. This approach departs from the views and doctrines of the science of law.

c) Comparative Approach (Comparative Approach). This approach is carried out by comparing a country's legal system or laws with laws from one or more other countries regarding the same matter, including court decisions. In legal comparisons, special comparisons or general comparisons can be made. Comparisons were made to discover the similarities and differences between each [6].

RESULTS AND DISCUSSION

The concept of cyber-notary in Indonesia was first embodied in law No 2 of 2014. The definition of electronic transactions, as stated in Article 1 No 2 of Law No 11 of 2008 concerning Information and Electronic Transactions, is: "Legal actions carried out using computers, computer networks, and/or other electronic media".

Implementing certification of transactions carried out electronically (cyber-notary) has a close relationship with the authenticity of a document. A certificate can clarify the authenticity of a document and the trustworthiness of an information and communication security system based on a specific classification, even though the security of electronic information or document is vulnerable to change. Some things that need to be considered in the authentication process are [7]:

1. The validity, validity or correctness of the identities of the parties where the electronic document originates, including the party sending and receiving the electronic record.

2. The authority of the party that creates, sends and receives electronic documents.

3. The validity or legitimacy of the devices or equipment used in creating, storing, transmitting and receiving electronic documents.

4. The validity or legitimacy of creating, storing, sending and receiving electronic documents.

5. Integrity or guarantee of the integrity of electronic documents

Law No 30 of 2004 concerning the Office of a Notary Public does not regulate cyber-notary matters. Whereas Law No 2 of 2014 mentions cyber-notary but does not provide a normative definition. So by including the Elucidation of Article 15, paragraph 3 of law No 2 of 2014, the provisions that are categorized as cyber-notary is the certification of transactions carried out electronically. Typically, a cyber-notary can be interpreted as the authority of a Notary electronically by utilizing information technology.

Notaries, as public officials, are given authority by law, one of which is to do authentic deeds. The granting of this authority is mentioned in the definition of a Notary in Article 1 point 1 of law No 2 of 2014. The power to do authentic deeds is reaffirmed in Article 15, paragraph 1 of law No 2 of 2014, which states that: "The notary has the authority to do authentic deeds regarding all actions, agreements and stipulations that are required by laws and regulations and/or that are desired by interested parties to be stated in an authentic deed, guarantee the certainty of the date of doing the deed, save the deed, provide Grosse, copies and quotations deed, all of that as long as the making of the Deed is not also assigned or excluded to other officials or other people determined by law".

In general, deeds made or issued by a notary are divided into two different types of acts, namely:

1) Relaas Deed is a deed drawn up or issued by a notary. The deed is an authentic deed made as a form of the authority of the position's duties. In doing an act, a situation or event witnessed or all events seen or carried out by a notary can be used as the basis for doing the deed [8].

2) Partij Deed is a deed which contains a complete series of information told or explained by the appeared, which is then based on the appeaser's statement. The notary confirms it as an authentic deed [9].

Cyber-notary is a concept that utilizes technological advances for notaries in carrying out their daily duties. Utilization or use of information technology by a notary in carrying out his duties and authorities can be found. For example, in making minutes of a meeting at the General Meeting of Shareholders of a Limited Liability Company by a Notary via teleconference where the deed is a type of release deed. In addition, it is also used in document digitization, electronic signing of deeds, online registration of legal entities through the Legal Entity Administration System website, and other similar matters.

Thus, de facto, it can be said that the cyber-notary applied to make a Notary deed does not reduce the authenticity of the act as long as it fulfils the provisions of a face-to-face meeting so that the notary can face the appearers concerned (including witnesses) and the signatures affixed to the deed must comply with the requirements of electronic signatures by statutory provisions.

The strength of proof of the deed of the General Meeting of Shareholders conducted by teleconference is the act of minutes of the General Meeting of Shareholders, and the doing of the statement of meeting resolutions having the power of proof attached to it is perfect and binding as the provisions of Article 1870 of the Civil Code [10].

The authenticity of a deed should not depend on the form determined by law but also on the public official authorized to draw up the act. The aims and objectives of the parties involving the notary as a third party in the legal actions they carry out, of course, are to obtain assistance, services, and legal opinions, which are independent and impartial and provide a guarantee of legal protection for the legal actions they carry out. This is indeed one of the obligations of a Notary in carrying out his position as stipulated in Article 16, paragraph 1 of the letter of the law No 2 of 2014, which reads: "In carrying out his position, a Notary is obliged to act trustworthy, honest, thorough, independent, impartial, and safeguard the interests of the parties involved in legal actions".

Cyber-notary is defined as using information technology in its functions, duties and authorities as a notary. Examples of information technology in question are computers or computer networks and other electronic media such as video conferences or teleconferences [11]. Therefore, if a notary, while carrying out his/her official duties, uses and/or utilizes information technology, then this can already be said to be a cyber-notary.

In implementing cyber-notary, there is a conflict between Article 15, paragraph 3 and Article 16, paragraph 1(m) m of law No 2 of 2014, which are in one rule. Article 15, paragraph 3 is the authority a notary gives to certify transactions in a cyber-notary manner. In contrast, Article 16, paragraph 1(m) explains the reading of the deed before appearers. It has been in line with the authenticity of the activities listed in article 1868 of the Civil Code.

In connection with other authorities given to notaries, namely to certify transactions using cyber-notary, the printout results of the certification can also be categorized as electronic documents where the electronic record must also fulfil the elements in article 1868 of the Civil Code regarding the authenticity of the deed.

Until now, there are still no regulations governing the cyber-notary concept. Therefore, the legal vacuum of rules relating to cyber-notary authority can have implications from various perspectives. In this case, the consequences for the absence of regulation regarding the power of a Notary over a cyber-notary can be reviewed and explained from multiple perspectives, including the legal vacuum regarding the authority of a Notary in doing deeds through cyber-notary and legal uncertainty.

The legal vacuum is one of the legal issues within the scope of legal dogmatics which arises apart from when the parties to a lawsuit or are involved in a debate put forward different or even contradictory interpretations of the text of the rules because of the ambiguity of the regulations themselves, or there are differences in performance of the facts [12].

Thus, based on the discussion above, Cyber Notary in Indonesia is still at the concept and implementation level, which is partial. Cyber notary regulations need to be formulated as soon as possible. Because based on the empirical reality of the urgency, it is necessary to develop rules regarding cyber-notary, that the legal needs of the community for cyber-notary are increasing every year, and there is a legal vacuum which fails to achieve one of the lawful objectives, namely legal certainty. Cyber-notary is a manifestation of legal progress in notary affairs.

Meanwhile, Japan is one of the most developed countries in the Asian region. Regarding system issues, Japan is one of the most skilled. The habit of Japanese citizens being structured and doing things quickly has made Japan one of the countries in Asia that have used a cyber-notary system since 2000. Even in the course of the inclusion of regulations regarding cyber-notary into the Notary Office Law, Japan became one of the countries legislators visited to conduct a comparative study.

Japan has given authority to Notaries, called kooshoonin, to do deeds electronically in Japanese. Even Japan has a special committee to handle the cyber-notary system, the Electronic Notarization Committee. Deeds are electronically made using the cyber-notary system and stored and managed by the Japan National Notary Association, an official notary professional organization in Japan like the Indonesian Notary Association.

Japan is a country that adheres to a civil law system. This system is the same as the legal system adopted by Indonesia. In its development, notaries have become known in Japan since 1886. That year, regulations regarding notaries were enacted in the Notary Execution Ordinance. At that time, Japanese notary arrangements were influenced by the French Notary Act, namely Le Leloi Ventôse, whose laws have existed since

1803. Later Japanese notary regulations were also influenced by Dutch law.

According to the researcher, what happened to Japan was also experienced by Indonesia because Indonesia was also influenced by Dutch law. Even though the concordance principle, Indonesia also applied Notary rules from the Netherlands before having special rules.

The rules regarding the cyber-notary system in Japan came into effect on January 15, 2002. Then not long ago, in April 2002, Japan launched a system capable of accommodating cyber-notary. In Japan, not all notaries can run the cyber-notary system. Only certain notaries can be appointed by the Ministry of Justice who can exercise cyber-notary authority (Japan National Notaries Association, 2022)

This is also stated in the Notary Act Japan Article 7, paragraph 2(1), namely: "Processes related to electronic or magnetic records, which are specified as processes to be carried out by a notary according to this Act and other laws and regulations, shall be handled by a notary designed by the Minister of Justice".

Notary authorities regarding cyber-notary are regulated in Article 1, paragraph 4 in the Notary Act Japan, namely: "Notaries have the authority to carry out the following processes upon commission from a party or any other person concerned: certified electronic or magnetic records (records made in electronic form, magnetic form, or any other form that is impossible to perceive by the human senses, which is used in information processing by computers). The same applies here that this applies only in cases of certifying electronic or magnetic records, other than those created by a government employee in performing said employee' studies".

In carrying out the authority of a notary through the cyber-notary system, it is carried out using an online application system for registration and storage operated by the Ministry of Justice. Electronic information exchange between the client and the designated notary is encrypted using SSL to prevent tampering or snooping by third parties and provide security and safety services. The Japanese Ministry of Justice has created an application that can be downloaded as a liaison between the notary and the appeared.

The procedures for cyber-notary deeds in Japan are as follows (Japan National Notaries Association, 2022).

a) A client prepares an e-document as a PDF document and executes a digital signature on the e-document.

b) A request for e-notarization is made online. For this purpose, the Ministry of Justice provides a reception page on the Ministry's website for clients of e-notarization. Application accepted, and a notary transfers this page to the e-notarization Center for notarization.

c) A notary downloads the e-document from the centre's server to his/her terminal in his/her office and examines the sit-to-see if it satisfies the requirements for notarization.

d) The notary takes acknowledgement of the e-signer (i.e., client). The client must have appeared in person before the notary. This is because of the general doctrine of physical appearance before the notary applications to e-notarization. However, as noted earlier, agents may participate in place of the principal in e-notarization.

e) When the notary is satisfied with the acknowledgement, they attach an acknowledgement certificate with his/her digital signature to the e-document and save it to a CD or other media for storage to give back to the client. The relevant Government departments issue digital certificates for notaries.

The electronic does not eliminate the obligation of the appearers to be present and sign the deed before the notary. Suppose you want to apply for the legalization of electronic documents. The notary then attaches his digital signature to the paper and saves it on a compact disc.

Such a system is consistent with the current Notary Act and the notary system, as the notary's office currently handles cyber-notary operations. In this system, it is also possible for appearers to choose the notary they use. This system seems convenient for applicants because applicants can quickly know where to send their registration. In addition, the cost of setting up a cyber-notary system will be relatively cheaper than a system where each notary office has a computer system to handle cyber-notary completely because electronic documents regarding cyber-notary are stored centrally in the centre of an electronic notary.

Similarities and differences in cyber-notary arrangements in Indonesia and Japan. The development of information technology and its relation to the implementation of the notary's posi-

tion gave rise to various kinds of responses, especially in Indonesia and Japan, which adhere to civil law, for example, the establishment of a separate Certification Authority / Certified Service Provider to support the use of electronic signatures from notaries who are members where these notaries can submit a copy of the deed made electronically. Because in implementing a cyber-notary, a notary cannot work correctly to provide solid legal legitimacy if he only works alone. The notary must be assisted and cooperate with a third party as an Electronic Certificate Operator/Certificate Authority.

Differences in cyber-notary regulation in Indonesia and Japan can be seen in the organization of notaries, procedures for carrying out cyber-notary, a Certification Authority/Certified Service Provider and witnesses. The Notary Office Law explains that a notary organization is a professional organization for the position of a Notary Public in the form of a legal entity association. The notary organization has a structure that aims to oversee the behaviour of the notary in carrying out his position as a notary, as well as implementing operational standards by the notary's code of ethics both in the notary's code of ethics and in Law No 2 of 2014 [13].

The notary organization has several facilities consisting of the Notary Honorary Council, Notary Honorary Council and Notary Supervisory Council. The Notary Honorary Council has the same authority to enforce the law internally within the notary association, in this case, implementing the notary's code of ethics. The Notary Supervisory Board has the power to issue decisions to decide on a hearing on a topic related to the notary profession that violates the code of ethics in carrying out the duties of a notary position with sanctions imposed by the Notary Supervisory Board. Meanwhile, the Notary Honorary Council has the authority to carry out the guidance of the notary and the obligation to give approval or reject the judicial process undertaken by the notary.

The Indonesian Notary Association is the only professional association for everyone who assumes and performs the duties of a Notary in Indonesia whose existence is recognized by the government as stated in Article 82 of Law No 2 of 2014. Meanwhile, there are 50 notary associations in Japan. However, Japan has one national notary organization called Nippon Koshonin Regokai. The Japanese Notary Association, or in Japan it is called the Japan National Notary Association, joined the International Union Of Latin Notaries in 1977.

The Japan National Notary Association aims to develop a notary system and improve services and quality by providing guidance and communicating with local Notary Associations and individual notaries. The Japan National Notary Association has one president, six vice presidents, 25 directors, and two auditors. Several managing directors are selected from among the directors, and a chairman of the board of directors is selected from among the managing directors. General meetings are held once a year, and executive board meetings are held about thrice yearly.

The procedure for carrying out cyber-notary in Indonesia has yet to be implemented, so it still needs a method for carrying out cyber-notary. Meanwhile, the Cyber Notary System in Japan features various notarization services, namely:

1. Electronic Official Stamped Date. The procedure for an officially stamped date electronically is as follows.

a) The applicant must apply for an official electronic stamp date on the electronic document. The current official date stamp must be attached to a paper-based document with a signature (Article 5(2) of the Civil Code of Enforcement). Still, an officially stamped date can be attached to an electronic document without a digital signature, image, or the like. In applying for an electronic stamp date, the electronic application form and documents attached to the electronic stamp date must be submitted. It is worth discussing whether a specific digital signature must be attached to the application form to confirm the intention to file a cyber-notary.

b) The cyber-notary office accepts the application.

c) The applicant must pay a fee, and the notary must confirm the completion of the fee payment. The payment procedure should be determined in the future. It may be possible to make applicants pay a fee in advance or use an electronic payment system.

d) The notary must attach the official date and digital signature to the electronic document, send it to the applicant, and save the hash of the electronic document. The notary must maintain the deed himself if the applicant wishes. The statement for the date of the official electronic stamp

must be clearly distinguished from the idea of certification for the notary of the personal electronic document.

2. Electronic Personal Document Notary. The procedures for an electronic deed notary are as follows.

a) The applicant must file a notarized application for electronic personal documents. What kind of electronic documents can be notarized should be discussed. At a minimum, electronic documents with certain digital signatures must be notarized. But the requirements for digital signatures must be specified in such cases.

b) The cyber-notary office accepts the application.

c) The notary must confirm the existence and intentions of the parties involved by verifying the digital signature attached to the personal electronic document or some other act and checking the effectiveness of the contents of the electronic document.

d) The notary must confirm the completion of payment of fees.

e) The notary must write a statement of certification and date on the personal electronic document and attach his digital signature.

f) The notary must send a notary's electronic document with a notary's digital signature to the applicant and maintain the document's contents.

3. Compilation of cyber-notary Documents. The procedure for doing a cyber-notary deed is as follows.

a) The applicant must apply the preparation of cyber-notary documents.

b) The cyber-notary office accepts the application.

c) The notary must ensure the application's contents and the parties' intentions. The steps for confirmation purposes at this stage can be moderate.

d) The notary must prepare a draft cyber-notary deed, attach the digital signature, send it to the applicant, and direct the applicant to secure the applicant's digital signature to the draft and send the current to the notary.

e) The applicant must verify the notary's digital signature, confirm the contents of the draft, attach the digital signature to it, and send it to the notary.

f) The notary will verify the applicant's digital signature.

g) The notary must confirm the completion of payment of fees.

h) The notary must confirm the eligibility of the draft notarial deed sent and attach a certification statement, date and digital signature to the document.

i) The notary must send the applicant a cyber-notary deed with a digital signature and maintain the contents of the cyber-notary act.

4. Maintenance of Electronic Documents and Certification of Existence and Contents of Electronic Documents. The procedures for validating the existence and contents of electronic documents handled by a Notary and kept at the Cyber Notary Office are as follows.

a) Users must ask a notary to certify the existence and contents of electronic documents stored in the Cyber Notary Office files.

This service is similar to the current notary system where the notary's original documents and notary articles of association are kept by the notary so that the original documents can be issued and copies can be issued. So it seems that there is no need to keep the contents of electronic documents with official stamped dates and notarized electronic personal documents (other than the notarized deed of establishment) because these documents are not kept by a notary and are not published in the current newspaper based on a notary system.

However, in the current notary system, the Register of Notaries (Article 61 of the Notary Law) records the outline of a notarized application for personal documents. The List of Official Stamped Dates (Article 6 of the Penal Code of Enforcement Law) records the design of the application for an official date stamp prepared. However, the contents of the document itself need to be maintained. So in building a cyber-notary system, the contents of notarized personal electronic documents and electronic documents with official stamped dates must be maintained to certify their contents by extending the function of the current Register. Such systems may clarify application content and be convenient for applicants and users. Clarifying the contents of the documents will prevent disputes about the contents of the documents stored. But if there is a large amount of electronic document data, saving all

the contents of the relevant documents is almost impossible.

In such cases, only the hash of each notarized electronic personal document and document with an official date stamp may be retained. However, all contents of the document may be retained for a fee if the applicant wishes the notary to do so. The details of these services need to be discussed further, bearing in mind future service requests.

CONCLUSIONS

In Indonesia, cyber-notary is still in the conceptual stage where Law No 2 of 2014 concerning Notary Positions presents the concept of cyber-notary but has yet to provide broad opportunities for cyber-notary application. Legal certainty can only be achieved when a legal basis already regulates cyber-notary. Starting with formulating the definition of cyber-notary, authorities and responsibilities of a notary in cyber-notary, to parties who assist, supervise and even those who give sanctions and prepare sanctions for violations in cyber-notary. Meanwhile, from the notary side, it is also necessary to study the readiness of Indonesian notaries to welcome cyber-notary. In Japan, cyber-notary has been implemented as regulated in article 1, paragraph 4 of the Japanese Notary Law.

The State of Indonesia has similarities in cyber-notary arrangements, which the notary laws of each country have regulated. However, in Indonesia, cyber-notary is still at a conceptual and regulatory level in the provisions of Article 15, paragraph 3 of law No 2 of 2014 concerning the Office of a Notary. In addition, Indonesia and Japan adhere to the civil law system (Latin notaries). As well as the countries of Indonesia and Japan that adhere to civil law have formed a separate Certification Authority/Certified Service Provider to support the use of electronic signatures from notaries who are members where these notaries can submit copies of the deeds they made electronically. Because in implementing cyber-notary, Notaries cannot work well to provide solid legal legitimacy if they only work alone. The notary must be assisted and cooperate with a third party as an Electronic Certificate Operator/Certificate Authority. Meanwhile, the differences between Indonesia's and Japan's cyber-notary arrangements lie in Notary Organization, Procedure for running a cyber-notary, Certification Authority/Certified Service Provider, and witness.

REFERENCES

1. Sihombing, L. B. (2020). Keabsahan Tanda Tangan Elektronik Dalam Akta Notaris [The validity of electronic signatures in notarial deeds]. *Jurnal Education and development, 8*(1), 134–140 (in Indonesian).

2. Makarim, E., & Kom, S. (2020). *Notaris dan Transaksi Elektronik Kajian Hukum Tentang CyberNotary atau Electronic Notary* [Notaries and Electronic Transactions Legal Studies on CyberNotary or Electronic Notary]. Depok: Tahun (in Indonesian).

3. Arisatya, C. G., Sihabudin., & Safa'at, R. (2015). *Urgensi Dan Relevansi Kewenangan Notaris Untuk Mensertifikasi Transaksi yang Dilakukan Secara Elektronik (Studi Di Notaris Wilayah Kerja Kota Malang)* [Urgency and Relevance of Notary Authority to Certify Transactions Conducted Electronically (Study in Notary Work Area of Malang City)]. Kumpulan Jurnal Mahasiswa. Retrieved from http://hukum.studentjournal.ub.ac.id/index.php/hukum/article/view/1235 (in Indonesian).

4. Nurita, E. (2012). *Cyber Notary (Pemahaman Awal Dalam Konsep Pemikiran)* [Cyber Notary (Initial Understanding in Conceptual Thinking)]. Bandung: Refika Aditama (in Indonesian).

5. Salim, H., & Nurbani, E. S. (2013). *Penerapan Teori Hukum Pada Penelitian Tesis* [Application of Legal Theory to Thesis Research]. Retrieved from https://www.rajagrafindo.co.id/produk/penerapan-teori-hukum-pada-penelitian (in Indonesian).

6. Ibrahim, J. (2005). *Teori dan Metode Penelitian Hukum Normatif* [Theory and Methods of Normative Legal Research]. Malang: Bayumedia (in Indonesian).

7. Makarim, E. (2015). Keautentikan Dokumen Publik Elektronik Dalam Administrasi Pemerintahan Dan Pelayanan Publik [Authenticity of Electronic Public Documents in Government Administration and Public Services]. *Jurnal Hukum & Pembangunan, 45*(4), 508. doi: 10.21143/jhp.vol45.no4.60 (in Indonesian).

8. Wijaya, P. A. P. D., & Prajitno, A. A. A. (2018). Tanggung Jawab Notaris Terhadap Kesalahan Dalam Pembuatan Akta Yang Dilakukan Oleh Notaris Penggantinya [Notary's Responsibility for Errors in Deed-Making Made by His Substitute Notary]. *Perspektif, 23*(2), 113. doi: 10.30742/perspektif.v23i2.684 (in Indonesian).

9. Gerungan, L. K. (2012). *Kekuatan Pembuktian Akta Di Bawah Tangan Yang Telah Memperoleh Legalitas Dari Notaris* [The Evidentiary Power of Underhand Deeds That Have Obtained Legality from Notaries]. Retrieved from http://repo.unsrat.ac.id/292/1/KEKUATAN_PEMBUKTIAN_AKTA_DI_BAWAH_TANGAN_YANG_TELAH_MEMPEROLEH_LEGALITAS_DARI_NOTARIS_LUSY_KFR_GE.pdf (in Indonesian).

10. Rizkianti, W. (2016). Akta Otentik Rapat Umum Pemegang Saham (RUPS) Melalui Media Telekonferensi (Mekanisme Pembuatan dan Kekuatan Pembuktiannya) [Authentic Deed of General Meeting of Shareholders (GMS) Through Teleconference Media (Mechanism of Making and its Evidentiary Power)]. *Jurnal Yuridis, 3*(1), 83–98 (in Indonesian).

11. Wijanarko, F., Mulyoto., & Supanto. (2015). Tinjauan Yuridis Akta Notaris Terhadap Pemberlakuan CyberNotary Di Indonesia Menurut Undang-undang Nomor 2 Tahun 2014 [Juridical Review of Notarial Deed Against the Implementation of CyberNotary in Indonesia According to Law Number 2 Year 2014]. *Repertorium, 2*(2), 7–19 (in Indonesian).

12. Marzuki, P. (2008). *Pengantar Ilmu Hukum* [Introduction to the Science of Law]. Jakarta: Kencana Pranada Media Group (in Indonesian).

13. Madyastuti, R. (2020). Kewenangan Majelis Pengawas Notaris Dalam Pencegahan Terjadinya Pelanggaran Kewenangan Dan Tugas Jabatan Notaris [The Authority of the Notary Supervisory Council in Preventing Violations of the Authority and Duties of Notary Office]. *Renaissance, 3*(5), 711–731 (in Indonesian).

Comparison of Legal Authority of Notary and Electronic Signature Validity in Indonesia and the United States of America

Ni Ketut Indah Primadani [1], **Djumardin** [1], **Aris Munandar** [1]

[1] *University of Mataram*
Jl. Majapahit No 62 Mataram, Nusa Tenggara Barat, Indonesia

DOI: 10.22178/pos.89-17

JEL Classification: K40

Received 26.12.2022
Accepted 29.01.2023
Published online 31.01.2023

Corresponding Author:
Ni Ketut Indah Primadani
indahprimadani37@gmail.com

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract The purpose of this research is to compare the analysis of the legal authority of a notary in Indonesia with the control of a notary in the United States. This is normative legal research with a statute, conceptual, and historical approach. According to a study, in carrying out their duties and positions, notaries in Indonesia are subject to and obedient to the law, which lies in the enactment for all of Indonesia. In contrast, in the United States, each state has its notary law. The legality of electronic signatures is valid in the eyes of the law when they meet several conditions. Electronic signatures must be certified to guarantee trust for the owner, namely in the form of authentication data. Any signature requirements under the law can be met in the states and territories where ESIGN is valid. In addition, electronic signatures can be presented as evidence and will survive in court as applicable. Uniform Electronic Transactions Act applies in some Indonesian states and territories.

Keywords: Notary Legal Authority; Signature Legitimacy.

INTRODUCTION

Civil law is a set of legal provisions that regulate the interests of individuals in their efforts to meet the needs of their lives and society. This civil law is said to be private law because what is regulated is about the relationship and interests between one another [1]. One of those mentioned in the Civil Code, whose authority is closely related to making authentic deeds and other authorities, is the notary. The position of a notary as a public official who does original deeds is increasingly considered necessary with developments in the field of law. Notaries are expected to bring positive results in implementing their duties and authorities in Indonesia.

Law No 2 of 2014 states that a Notary is a public official authorized to do authentic deeds and has other authorities as referred to in this law or based on a law's different rules. An act is original not because of the stipulation of law but because it is made by or before a public official. The authenticity of a notary's deed originates from Article 1, in which a notary is made a "general official" so that a deed made by a notary in that position acquires the nature of an authentic act, as referred to in Article 1868 of the Civil Code.

The function of an authentic deed in terms of proof is certainly expected to be able to explain in full in the evidentiary process at trial. An original deed as a product of a notary in defence at trial is categorized as documentary evidence. The authority to do this authentic deed is at the parties' request as long as it does not conflict with Article 1320 of the Civil Code. Based on this authority, in carrying out its duties and obligations, a notary must provide guarantees of legal certainty.

In this regard, the authors are interested in comparing duties and powers between notaries in Indonesia and notary public in the United States; and comparing of legality and legal authority of electronic signatures in Indonesia and the United States.

METHODS

The type of research used in this research is normative legal research. This research was carried out based on existing legal regulations. It is called doctrinal legal research because it is carried out or aimed only at written rules or legal materials [2]. This type of legal research often

examines legal material conceptualized as written law in statutory regulations (law in the book) or law conceptualized as rules or norms that are benchmarks for human behaviour that are considered appropriate [3].

The problem approach method used in this study is:

a) Statute Approach, which prioritizes legal material in laws and regulations as primary reference material for conducting research. The approach is to examine all laws and regulations related to the legal issues being handled [4].

b) Conceptual approach, moving from the views and doctrines that developed in the Science of Law by studying the beliefs and principles that evolved regarding the problem under study [5].

c) Historical Approach, this approach is carried out to understand the philosophy that underlies the rule of law. This approach is carried out by examining the background and development of regulations regarding the issues at hand.

d) Comparative Approach is an approach that compares legal regulations or court decisions in one country with legal regulations in other countries (can be one or more countries).

RESULTS AND DISCUSSION

Comparison of Legal Authority of Notaries in Indonesia and the United States

In the Law of the Republic of Indonesia, No 2 of 2014 states Notary Public is officially authorized to make deeds authentic and has other powers. That definition makes a notary a public official so that the legal consequences in the Notary Deed get an exact position and have an executorial nature.

The duties of a notary as a public official, there are the following elements [6]:

1. Public Official does not mean that the notary is a civil servant referred to in Law No 43 of 1999 concerning Staffing Principles.

2. Notaries are not civil servants from an employee corps, structured with a hierarchical working relationship (meaning the order of levels or levels of office or rank of office).

3. A notary is not a paid position. A notary does not receive a salary from the government but receives an honorarium from those who request the services of a notary.

According to Article 1868 of the Civil Code, an authentic deed is meant as a deed in the form according to the provisions of the law made by or before a public official who is authorized to do so at the place where the act was done.

The leading authority possessed by a notary is to do an authentic deed. A deed must fulfil Article 1868 of the Civil Code to be accurate, also called an act under the hand. There are several differences between an original deed and a deed made under the needle, namely:

1. Authentic deed. It is perfect evidence as stipulated in article 1870 of the Civil Code. This deed has the strength of such evidence because it is considered attached to the act itself, so it does not need to be proven again. For the judge, it is "compulsory evidence". Whoever states that an authentic deed is fake must prove the falsity of the act. Because of that, an original deed has perfect evidentiary power both physically, formally and materially.

2. Under the hand deed. The deed under the hand of the judge is "Free Evidence" because the deed under the hand only has the strength of material evidence after being proven vital in the formal Meanwhile, the power of the formal proof will only occur if the parties concerned know the truth of the contents and method of doing the deed. Thus the deed under the hand is different from an authentic deed because if a deed under the hand is declared fake, then the one who used the deed under the writing it as evidence must prove that the deed is not affected. Based on the description above, a deed made authentically with a deed made privately has the value of establishing a deed.

The authority given to a position must be based on the rule of law as a limitation so that the work can run well and does not collide with the power of other places [7]. The law gives authority to a notary to make a document in the form of a Notary Deed in civil law [8].

The authority of a Notary in Article 15, paragraph 1, namely: "The Notary has the authority to do authentic deeds regarding all actions, agreements and provisions required by laws and regulations and or desired by interested parties so that they are stated in an authentic deed, guaranteeing the certainty of the date drawing up the deed, keeping the deed, providing Grosse, copies and excerpts of the deed, all of that as long as the making of the deed is not assigned or exempted

from other officials or other people determined by law."

Based on the authority above, the notary can do a deed as long as it is desired by the parties or according to legal regulations. The act must be done in the form of an authentic deed. The deed made by a notary must be based on legal rules relating to the procedure for making a notary deed. Furthermore, according to Article 15, paragraph 2, the notary also has the authority to:

1. Validate the signature and determine the certainty of the date of the letter under the hand by registering it in a particular book.

2. Book private letters by registering them in a particular book.

3. Make copies of the original confidential documents in a composition containing the written description in the relevant letter.

4. Verify the compatibility of the photocopy with the initial letter.

5. Providing legal counselling in connection with doing deeds.

6. Doing deeds related to land.

7. Make a deed of minutes of the auction.

Then in Article 15, paragraph 3 stated that in addition to the powers mentioned above, notaries have other authorities regulated in legislation.

In carrying out his duties and authorities as a public official, the notary authorized making authentic deeds and other authorities. Given the responsibilities, functions and management of a Notary very important for the traffic of people's lives, the behaviour and actions of a Notary in carrying out his professional position are vulnerable to abuse which can be detrimental to society. Hence, institutions for fostering and supervising Notaries need to be made effective.

In terms of carrying out the duties of his position as a notary, the notary has responsibility for his work and must be responsible to his client and for all his actions. The notary's responsibility is not only for himself and his professional colleagues but also for clients and the public who need his services. It must be understood that a notary carrying out his duties and positions must be based on responsibility and morals so that later it is hoped that the notary will be able to carry out his duties and functions as regulated by law and what is required of a notary by law and the public interest. Being responsible to the community means that a notary is willing to provide the best possible service by his profession without distinguishing between paid and complimentary services. A notary must be able to produce quality services that have a positive impact on the community. Being responsible also means bearing the risks arising from the services it provides.

The conceptual and substantive differences between the US legal and civil law systems and how lawyers practice in the United States that enable civil law notaries raise fundamental ethical and practical questions.

The National Association of Civil Law Notaries has recommended the Civil Law Model Notary Act to states to allow the establishment of civil law notaries. Alabama and Florida are the only US jurisdictions that have enacted laws allowing civil law notaries. The Alabama Statute is based on the acting model. The Florida Ordinance was passed in 1997 primarily to enable legal documents certified by civil law notaries in Florida to have legal effect in civil law countries, especially in Central and South America.

This model incorporates the concept of a civil law notary as an office in a civil law country. The model civil law notary deed recommends that a civil law notary be a lawyer admitted to practising law within the jurisdiction who has practised for at least five years. Lawyers must successfully pass a civil law notary examination. Florida regulations prescribe a particular course of study and analysis for civil law notaries.

In general, in America, a Notary is in charge of giving advice and preparing documents, especially documents for treaty relations with foreign countries. In the United States, a notary is appointed by a state government, for example, Governor, Lieutenant Governor, Secretary of State, or in some cases, the state legislature, whose primary role is to serve the public as an impartial witness when important documents are signed. Because a notary is a state official, the duties of a notary can vary widely from state to state. Notaries are often only allowed to act outside their home state if they also have a commission.

A notary is almost always permitted to notarize documents wherever in the state where their commission is issued. Some states only issue commissions "generally," meaning no indication is made of which state the commission was printed from. Still, some states require the notary to include the area of issue of their commission

as part of the jury or, where a seal is needed, to indicate the size of the case of their commission on the seal. If a state requires to show the county where the commission was issued, it does not mean that notaries are restricted from notarizing documents in that area. However, some states may enforce this as a requirement.

Notaries in the United States are far less tightly regulated than notaries in most other common law countries, usually because US notaries have little legal authority. The most common notarial acts in the United States are taking acknowledgements and oaths. Many professions may require someone to also serve as a notary, which is why US court reporters are often notaries. This allows them to swear as witnesses (deponents) when depositing; secretaries, bankers, and some attorneys are usually public notaries. Although their role is limited, some American notaries can perform several small actions not generally found elsewhere. Depending on the jurisdiction, they may take depositions.

The visible similarity between Indonesian Notaries and Notaries in the State of Alabama, United States of America, is that the Notary in Alabama has the same authority to do an authentic deed. In Indonesia, this authority is the leading authority of a Notary.

Other notary authorities in Alabama, namely:

1. Swear an oath in all matters relating to the implementation of his office.

2. Take acknowledgement or proof of papers relating to trade or navigation and certify the same and all other official acts under the seal of their office.

3. Demand acceptance and payment of money orders, promissory notes and all other writings regulated by commercial law regarding grace days, requests and notifications of non-payment and the same protest not to be accepted or not paid and to give notice thereof as required by law.

4. Under commercial use or state law, exercising such other powers that may belong to a notary public.

As can be seen from the description above, the Notary in Alabama has several roles that seem more prominent than other authorities, namely to pronounce an oath and take confessions or evidence of letters or, in other words, legalize essential documents related to law.

Notarial Deed. A notary deed in Indonesia is an official document issued by a notary according to the Civil Code Article 1870, which has absolute and binding evidentiary power.

Deed made by Notary in Indonesia: Act of Establishment of PT; Foundation Establishment; Business Entity Establishment; Power to sell; Lease Agreement; Sale Purchase Agreement; Information on Inheritance Rights; Will; Establishment of a CV; Acknowledgement of Debt; Credit Agreement; Granting of Mortgage Rights; Cooperation Agreement; Work Contract; All forms of agreements that are not excluded from other officials.

Notary deed in Alabama, namely an authentic act which contains a compact, transaction or other legal action and which can also include validation of facts. A notarial deed may involve one party, as in the case of a will, or multiple parties, as in a contract.

The similarity between Indonesian and Alabama notarial deeds is that they produce authentic acts such as agreements, arrangements and wills.

The visible difference is that the notary in Alabama has a limited scope of notary deed coverage, which does not produce deeds of the establishment of companies or business entities.

Contents of the Notary Deed. Notary deeds in Indonesia consist of the beginning of the act or the head of the show, the body of the show, and the end or closing of the deed, the detailed elaboration of which is regulated in Article 38 UUJN.

While the contents of the Alabama Notary Deed contain the following:

1. Handwritten signature and genuine stamp of Alabama Notary.

2. The full name of the Notary of Alabama is typed in the form in which the application for notary appointment was initially filed with the Office of the Secretary of State.

3. The words "Notary Public of Alabama" are typed in English.

4. Current business address and telephone No of Alabama Civil Notary Public typed in English.

5. A statement typed in English that "Under the laws of the State of Alabama, Act No. 99-449, this authentic deed is legally equivalent to the notarized civil law authentic deed in all jurisdictions outside the geographic boundaries of the United

States and was issued under the authority of the Secretary of State of Alabama."

The original deed date is signed and sealed by the Alabama Civil Notary and the parties' signatures to the transaction.

All words or statements required to appear in English can also occur in other languages.

An authentic deed may also contain information or other material necessary to comply with any legal requirements, address ethical or legal issues, or the parties' business needs to the transaction.

Similarities between the contents or contents of the notary deed in Indonesia and Alabama, namely that they both contain the notary's signature as well as the parties and the notary's stamp, containing the full name and office or domicile of the notary

The visible difference is that the notary in Indonesia contains the deed in detail and is systematically related to the notary and the parties interests. In contrast, the contents of the notary deed in Alabama have a limited scope. Another difference can also be seen in the language used; the notary deed in Indonesia uses Indonesian, while the notary deed in Alabama uses English.

Ratio Electronic Signatures of Indonesia and the United States

The definition of "Signature" in general is an arrangement (letter) or a sign in the form of writing from the person signing, with which the person making the statement can be individualized [9]. A signature is a statement of the will of the signature maker (signer). By affixing his signature under a piece of writing, he wants that writing to be considered in law as his writing [10].

A signature is part of a fundamental culture in the interaction of society. A signature is essential because a signature is a form of representing someone's agreement on something. Applying the signature itself has four primary purposes: evidence, a sign of approval, fulfilment of formalities and efficiency. A signature is a way to provide validation and is helpful as a sign of identity for an agreement. Along with the development of conventional signatures, they are transformed into electronic signatures, which make it easier to use them to form a deal even at a considerable distance. Electronic signatures can provide practical and fast solutions for making agreements.

An electronic signature is a technology that is gaining popularity in Indonesia. This technology allows electronic signatures to be carried out face-to-face without physical documents. Electronic signature technology is considered to revolutionize agreeing on contracts to be easier, faster and more efficient. However, although electronic signature technology is supposed to provide many benefits, it still needs to be filled with many doubts, one of which is whether it is true that electronic signatures can be legally recognized in the eyes of applicable law in Indonesia.

Signatures generally have a broader meaning, namely: something code or sign that is used as a tool for legalizing signed documents, while electronic signatures have a narrower sense, namely the application of a set of computer techniques to information that is useful for maintaining document security [11].

Electronic Signatures in Indonesia. Through an electronic signature, an electronic document can be ratified by the parties that agree. The authenticity of the paper can also be guaranteed because, with the electronic signature on the record, the parties can no longer change the contents of the agreement. After all, if you make changes to the document, it will be known through a separate system. This guarantees the authenticity of electronic documents signed through electronic signatures. Electronic signatures use unique computer algorithms and techniques in their application that can prevent changes to the document's contents.

Regarding the position of electronic signatures in transactions, there is a fundamental law that regulates as in article 1338, which states, "All agreements made legally by the law apply as laws for those who make them". This principle of freedom of contract has emphasized that the parties can agree in any form and media as long as it does not conflict with the provisions of the law, which regulate the legal requirements of an agreement to be bound as stipulated in article 1320 of the Civil Code, namely: 1) Agreement from both parties; 2) The ability to perform legal acts; 3) There is an object; 4) There is a lawful cause.

Terms of agreement and competence are personal requirements for the validity of the deal,

and if there is a violation, the result of the contract can be cancelled. At the same time, the following condition is a sure thing, and a legal cause is an objective condition that becomes a limitation on the object agreed upon. If this condition is not fulfilled, it is considered null and void.

Based on the provisions of Article 1320 of the Civil Code, there is no problem with the media used in transactions. In other words, Article 1320 of the Civil Code does not require the form and type of media used in commerce. Therefore, it can be done directly or electronically.

Article 1975 of the Civil Code provides for arrangements regarding a person's signature, which read: "A private writing whose truth is acknowledged by the person presented to it or legally considered to have been justified by it, creates complete evidence such as an authentic deed for those who sign it, their heirs and those who derive rights from them". Therefore, the validity of a signature comes from the acknowledgement of the person who put the signature. As an innovation in technology in Indonesia, electronic signatures have been regulated in laws, and regulations have been issued since 2008 concerning Electronic Information and Transactions (ITE), which were later amended to become law.

Since the enactment of the ITE Law in 2008 was then changed to law No 19 of 2016, which is the foundation for the application of electronic signature technology in Indonesia. However, it was only in 2012 that a government regulation was issued, which was later changed to Government Regulation No 71 of 2019, concerning the implementation of electronic systems and transactions, which became the legal basis for online transactions and the implementation of electronic signatures in Indonesia.

According to Indonesian law, electronic signatures are regulated in Article 1, paragraph 12 of law No 19 of 2016 concerning Amendments to Law No 11 of 2008 concerning Information and Electronic Transactions.

Regarding electronic signatures according to Indonesian law, electronic signatures are regulated in article 1, paragraph 12 of Law No 19 of 2016 concerning Electronic Information and Transactions, which the meaning: "Electronic Signature is a signature consisting of Electronic Information attached, associated with or related to other Electronic Information that is used as a means of verification and authentication".

Law No. 19 of 2016 concerning Amendments to Law no. 11 of 2008 concerning Information and Electronic Transactions and PP No. 71 of 2019 concerning the Implementation of Electronic Systems and Transactions, electronic signatures can be considered valid in the eyes of the law and have a legal basis.

The Electronic Information and Transaction Law (UU ITE) has principles including neutrality in technology or freedom of choice. This includes selecting the type of electronic signature used to sign electronic information and/or document. The neutral origin of technology in the Information and Electronic Transactions Law needs to be understood carefully. Parties conducting electronic transactions should use electronic signatures with legal force and valid legal consequences as stipulated in Article 11, paragraph 1 of the law. Electronic Information and Transaction Law (UU ITE).

Furthermore, when reviewing the legal force regarding electronic signatures, according to Indonesian law, electronic signatures are regulated in Article 1 paragraph (12) of law No 11 of 2008 concerning Electronic Information and Transactions, which means: "Electronic Signature is a signature consisting of Electronic Information that is attached to, associated with or related to other Electronic Information that is used as a means of verification and authentication.

Articles 5-12 of law No 19 of 2016 say that electronic information and/or electronic documents and/or printouts are valid legal evidence and are an extension of valid proof by the procedural law in force in Indonesia. The law also stipulates that electronic signatures have legal power and consequences as long as they are made according to the specified requirements.

Electronic Signatures in the United States. In the United States, e-signature laws are regulated at the federal and state levels. Under the federal ESIGN of 2000, electronic signatures generally have the equivalent legal status to handwritten signatures.

ESIGN applies uniform national standards to all electronic transactions and encourages the use of electronic signatures, electronic contracts and electronic records by providing legal certainty for these instruments when parties adhere to its standards. ESIGN predates any state statute to the extent that they are inconsistent with it. This law makes electronic signatures legal in every US state and territory where federal law applies.

This puts digital signatures on the same level as handwritten signatures regarding legality, which is a huge win for businesses and consumers who are otherwise burdened with physically signing documents.

An electronic signature is defined in ESIGN as "an electronic sound, symbol, or process attached to or logically associated with a contract or other record and executed or adopted by a person with the intent to sign the record."

The broad definition of "electronic signature" was intended to allow for many types of technology and methods for signing electronically. An electronic signature can be nearly anything produced by electronic means (for example, a symbol, result, or consequence) created to demonstrate a party's intent to sign an electronic record.

However, several components must be present for an electronic signature to provide complete legal protection under an ESIGN. There needs to be a clear intention to sign documents, express consent to do business electronically, straightforward options for opting out of doing business electronically, and distribution and storage of digital documents. The customer and the company must receive a copy of the digital signature for their records.

UETA (Uniform Electronic Transactions Act) applies in some states and territories. This law also states that digital signatures are legally binding. Similar to ESIGN, there are legal protections that come with UETA. Digital signatures are considered valid and binding, meaning that documents cannot be denied just because they are digitally signed.

In addition, it reflects the protection of ESIGN, which states that where signatures are required by law, digital signatures can be used legally. It also protects the digital record, not just the signature itself. That means if the law requires written records, digital records will also comply with the law under the UETA.

Several documents are exempt from UETA, such as marriage, birth, or death certificates, as well as wills and other inheritance documents. The main difference between ESIGN and UETA is the rate at which the action is created. ESIGN is a federal digital signature law, whereas UETA is a state-level act adopted by most states. If federal law does not apply, which will cover certain US States and territories, ESIGN cannot be enforced. However, at the state or territory level, UETA may be implemented for digital signature protection.

Under the ESIGN and UETA Acts, electronic signatures have the same evidentiary power as handwritten signatures in most cases in the United States.

CONCLUSIONS

The comparison of the duties of a Notary under the Indonesian Notary Law and the United States Public Notary Law lies in the enactment of UUJN for all of Indonesia. In contrast, in the United States, each state has its notary law. From a comparison of notaries in Indonesia and in the State of Alabama, the United States, the similarities and differences are obtained from several apparent aspects, namely the finances of the notary, the deed and the contents of the notary deed.

Electronic signatures' validity and legal force are contained in Article 11 of Law No 19 of 2016 concerning Information and Electronic Transactions, which explains that Electronic Signatures have legal power and legal consequences. It is said to be valid in the eyes of the law when it fulfils several conditions, especially the electronic signature must be certified to guarantee trust for the owner, namely in the form of data authentication. The legal strength of an electronic signature is like the strength of a manual signature contained in an authentic deed, which is complete and perfect. Electronic signatures generally have the same status as manual ones, which have legal force and consequences. The use of electronic signatures in court is a form of expanding valid evidence by the Indonesian procedural law to be used as one of the judge's considerations in deciding a case considered good as long as the information contained therein can be accessed, displayed, guaranteed for its integrity, and can be accounted for to explain a situation. This proves that the validity of electronic signatures can be recognized as valid evidence in the applicable procedural law in Indonesia. The ESIGN Act validates digital signatures and creates additional legal protections. Any signature requirements under the law can be met with an electronic signature in the states and territories where ESIGN is valid. In addition, electronic signatures can be presented as evidence and will survive in court. UETA applies in some states and territories. This law also states that digital signatures are legally binding.

REFERENCES

1. Prasetyaningtyas, Y. (2014). *Hukum Untuk Orang Awam* [Laws for the Layman]. Yogjakarta: Efata Publishing (in Indonesian).

2. Muhaimin. (2020). *Metode Penelitian Hukum* [Legal Research Methods]. Mataram: Mataram University Press (in Indonesian).

3. Amiruddin, S. H., & Asikin, Z. (2018). *Pengantar Metode Penelitian Hukum* [Introduction to Legal Research Methods]. Jakarta: Raja Grafindo Persada (in Indonesian).

4. Muhammad, A. K. (2009). *Metode Penelitian Hukum* [Legal Research Methods]. Jakarta: Raja Grafindo (in Indonesian).

5. Ibrahim, J. (2003). *Teori, Metode Hukum Normatif* [Theory, Normative Legal Methods]. Malang: Bayu Media Publishing (in Indonesian).

6. Andasasmita, K. (1983). *Notaris* [Notary]. Selayang: Alumni (in Indonesian).

7. Adjie, H. (2008). *Hukum Notaris Indonesia* [Indonesian Notary Law]. Bandung: Refika Adhitama (in Indonesian).

8. Budiono, H. (2011). *Ajaran Umum Hukum Perjanjian dan Penerapannya di Bidang Kenotariatan* [General Principles of the Law of Treaties and its Application in the Field of Kenotariatan]. Bandung: Citra Aditya Bakti (in Indonesian).

9. Budiono, H. (2007). *Kumpulan Tulisan Hukum Perdata di Bidang Kenotariatan* [Collection of Civil Law Writings in the Field of Kenotariatan]. Bandung: Citra Aditya Bakti (in Indonesian).

10. Tan, T. K. (1994). *Studi Notariat dan Serba Serbi Praktek Notaris* [Notarial Studies and the Nitty Gritty of Notary Practice]. Jakarta: Ichtiar Baru Van Hoeve (in Indonesian).

11. Raditio, R. (2014), *Aspek Hukun Transaksi Elektronik: Perikatan, Pembuktian dan Penyelesaian Sengketa* [Legal Aspects of Electronic Transactions: Liability, Evidence and Dispute Resolution]. Yogyakarta: Cipta Bakti (in Indonesian).

The Effectiveness of Multi-Agency Operation Leadership in Mitigating Insecurity in Lamu County, Kenya

John K. Simiyu [1]

[1] *Kenyatta University*
P. O. Box 43844-00100, Nairobi, Kenya

DOI: 10.22178/pos.89-27

JEL Classification: K40

Received 17.11.2022
Accepted 05.12.2022
Published online 31.01.2023

Corresponding Author:
jsimiyu2020@gmail.com

© 2023 The Author. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract There has been much discussion among various stakeholders on the benefits of multi-agency operations in response to security threats. This discussion is constrained, though, in that it downplays the complexity of multi-agency operations. Despite this, several nations, like Kenya, have used a multi-agency approach to deal with challenges related to national security; nevertheless, there is insufficient empirical evidence about the usefulness of this method in reducing insecurity issues. This study aimed to ascertain how well multi-agency operations leadership mitigated insecurity in Lamu County, Kenya. The collaborative advantage theory served as the basis for the investigation. This study used an ex post facto survey research design methodology. The study was carried out in Lamu County with a particular interest in the county's security personnel: an interview schedule and a questionnaire with structured and open-ended questions served as the data-gathering tools. The essential characteristics of the quantitative data gathered were displayed using descriptive statistics, including frequencies and percentages. Thematic analysis was used to create themes by grouping and open coding. The study discovered that multi-agency collaboration leadership successfully reduced insecurity in Lamu County. The study marked these out to address cases of inter-agency rivalry disputes, agency inferiority and superiority complexes, and the necessity to build a shared working policy on the ranking structure for the concerned agencies. The ongoing multi-agency operation has made Lamu County, in general, safer and more stable. Researchers interested in the leadership efficacy of multi-agency procedures are expected to benefit from the findings of this study, as will policymakers in the security sector.

Keywords: Multiagency Operations; Collaboration; Security Formations; PSV Attacks; IED Attacks; Kenya, Lamu County.

INTRODUCTION

Attacks by alleged Al-Shabaab terrorists from Somalia have increased Lamu County's insecurity level. The first significant attack in Lamu County that required the deployment of multi-agency forces occurred in Mpeketoni town on June 15, 2014, with the loss of 60 lives. As illustrated in Table 1, the attacks have continued despite ongoing multi-agency operations in Lamu County over the past eight years.

Table 1 – Suspected Al-Shabaab Activities in Lamu County, Kenya

Date	Location	Details	Causalities
8/11/2022	Mswakini Village near Bargoni Military Camp	Suspected Al-Shabaab militants detonated explosives in a local pub destroying the wooden structure and damaging the roof. The militants also distributed leaflets to locals warning of more attacks	No casualties
18/7/2022	Lamu	GSU officers arrested a suspected Al-Shabaab militant and recovered 1 RPG launcher, 1 RPG heat warhead and two booster housings	No casualties

Date	Location	Details	Causalities
11/3/2022	Majengo	Al-Shabaab militants attacked a construction site, burnt two vehicles and damaged a bridge	Six people were killed
9/2/2022	Milhoi area	Suspected Al-Shabaab militants burnt two construction vehicles for H Young the company constructing the Lamu-road Gamba	No casualties
27/1/2022	Lango La Simba	Suspected Al-Shabaab militants attacked a ferrying vehicle court officials from Kipini headed to Garsen to conduct a mobile court	Two court officials were injured
23/1/2022	Lamu	Suspected Al-Shabaab militants burnt down eight trucks belonging to China Communication Construction Company(CCC) building the Lamu Port South Sudan Ethiopia Transport (LAPSSET) corridor project	No casualties
3/1/2022	Witu	Suspected Al-Shabaab militants attacked Witu village in Lamu and torched three houses	Six people were killed
1/11/2021	Sankuri	Suspected Al-Shabaab militants detonated an IED hitting a water boozer lorry	One person was killed, three injured
27/9/2021	Along Kiunga Ishakani road	Suspected Al-Shabaab militants attacked a KDF convoy with an IED destroying an armoured personnel carrier	Undisclosed Officers reported dead
20/12/2020	Lamu Gamba Road	Suspected Al-Shabaab militants ambushed a police escort vehicle	Three officers injured
15/7/2020	Kiunga Sarira Road	IED explosion while security officers were on patrol	Two security officers injured
21/3/2020	Milhoi area	Suspected Al-Shabaab militants ambushed security officers	No injuries
19/3/2020	Nginda area between Karisa and Bargoni	KDF officers raided an Al-Shabaab camp	12 Al-Shabaab Militants killed
18/1/2020	Pandanguo	50 suspected Al-Shabaab militants attempted to attack Pandanguo village but were repulsed by security officers	No casualties
5/1/2020	Manda Naval Base Lamu	Al-Shabaab attacked Kenya Navy Manda bay airstrip	Nine casualties
2/1/2020	Lamu-Gamba road	Suspected Al-Shabaab militants ambushed a convoy of PSV buses	No causalities

Even though the multi-agency operation has already cost a lot, there are still signs of insecurity in Lamu County, as evidenced by the closure of churches and schools, the collapse of the tourism industry due to kidnappings and murders of tourists, the paralysis of the transportation industry due to attacks on public service vehicles (PSVs), and the placement of improvised explosive devices (IEDs) on critical roads in the county, despite the deployment of multi-agency soldiers made up of National Police Reserve officers (NPR), the KDF, KWS, KFS, and NPS. Lamu County's insecurity level makes it unclear whether the multi-agency leadership strategy is working to reduce it there. However, there isn't enough empirical data available to help determine the efficacy level of Lamu County's multi-agency operations. Studies on extremism, counter-violence, and community policing have all been undertaken in Lamu County, but none have examined the effectiveness of multi-agency operations in Kenyan County. Therefore, the issue that motivates this study is that although multi-agency operations heavily cover Lamu County, terrorist attacks continue to occur there. Therefore, this study aims to evaluate the effectiveness of multi-agency leadership in reducing insecurity in Lamu County, Kenya.

Since its inception in 1990, authors [6] expanded the practice-oriented Collaborative advantage theory. The theory aims to improve practical comprehension of the organizational issues involved in multi-agency working. Two opposing concepts are crucial to understanding the idea of collaboration: collaborative inertia, which relates to the frequently poor productivity in practice, and collaborative advantage, which deals with the potential for synergy from multi-agency working [6]. The theory focuses on the factors that drive collaboration, notably command and

control and addresses leadership in the context of multi-agency working. Effective management and control will guarantee that the collaboration's goal is achieved. But the inverse is also accurate. The collaboration's failure to accomplish its goals is caused by ineffective command and control. The collaborative advantage idea has been used to examine complex workplace tasks focusing on various characteristics [3]. As a result, it is regarded as a solid theoretical framework for analyzing, understanding, and transforming the multi-agency working practices of Kenyan security services. The collaborative advantage theory anchors the study's specific goal, which is to assess the efficiency of multi-agency leadership in the coordination of efforts to reduce insecurity.

The study's goal is to evaluate the efficiency of multi-agency leadership in coordinating efforts to reduce insecurity. The current research on leadership effectiveness in multi-agency operations has certain empirical limitations. The prior research about the Kenyan context needs more rigorous studies. In the context of multi-agency operations in Kenya, some undiscovered multi-agency leadership and coordination topics are crucial and deserving of inquiry. The effectiveness of multi-agency leadership in coordinating actions for minimizing insecurity in the Kenyan setting will be determined by conducting an empirical investigation of these problems.

METHOD

The study used ex post facto design to collect and analyze quantitative and qualitative data. Qualitative and quantitative techniques were predicated on the idea that the mixed method approach amplifies vital aspects and reduces weak points of both qualitative and quantitative methods to conclude the study [1]. The study aimed to evaluate the effectiveness of multi-agency operation leadership in reducing insecurity in Lamu County, Kenya. This research was conducted in Kenya's County of Lamu. The County of Lamu is located in the nation's North Coast region, bordered to the north by Garissa County, to the northwest by Tana River County, to the south by the Indian Ocean, and to the northeast by the Republic of Somalia. The county's coordinates are latitude 1° 40' and 2° 30' south, longitude 40° 15' and 40° 38' south. The county's 6,273.1 km^2 land area is divided between the mainland and the more than 65 islands that comprise the Lamu Archipelago. The total length of the coastline is 130 km, whereas the whole land and water area is 308 km.

All of the security officers in Lamu County comprised the survey's target population. To minimize bias and ensure representativeness, stratified random sampling was used as the sampling technique during this investigation. The entire population had to be divided into smaller groups to construct strata by sampling. These strata were created based on the various security formations that study participants, including the KDF, GSU, KWS, KFS, and NPR, are a part of. From the population of 833 officers allocated proportionately depending on the population proportion, a sample of 270 security officers was taken by applying Solvin's formulae. The study subjects' unprocessed responses to a semi-structured questionnaire and interview questions were used to compile the raw data. Analyzing data was organized and included the processing, presentation, analysis, and interpretation of the raw data. The study used both qualitative and quantitative data analysis techniques.

RESULTS AND DISCUSSION

The study aimed to determine how well multi-agency leadership coordinated efforts to reduce insecurity in Lamu County, Kenya. Interviews with key informants were done as part of the data collection process, which used questionnaires and descriptive analysis. Ordinal data and a Likert scale with responses ranging from strongly disagree to undecided to agree and strongly agree were required for the five questions. The operationalization of variable leadership included clear command and control, effective resource management, staff motivation, specific goals and objectives, monitoring and evaluation. The results are displayed in the section that follows. The study's findings are presented in Table 2.

Clear Command and Control. The leadership of a multi-agency operation must include clear command and control. The confusion brought on by unclear command and control may prevent the multi-agency process from achieving its goals. When asked if there was clear command and power in the multi-agency operation in Lamu County, the respondents' responses are shown in Table 2 of the study results.

Table 2 – Multi-agency Leadership

Statement	Rating									
	SD		D		N		A		SA	
	F	%	F	%	F	%	F	%	F	%
There is clear command and control in the multi-agency operation	15	7.4	18	8.9	17	8.4	62	30.5	91	44.8
There is proper utilization of resources in the multi-agency operation	22	10.8	33	16.3	25	12.3	43	21.2	80	39.4
There are motivated staff for all agencies in the multi-agency operation	33	15.5	97	45.5	49	23.0	29	13.6	5	2.3
There are clear aims and objectives for the multi-agency operation	0	0	0	0	4	1.6	88	35.6	154	62.3
There is monitoring and evaluation of the multi-agency operation	14	6.9	221	10.8	4	2.0	62	30.5	101	49.8

Most respondents (44.8%) strongly agree, followed by 30.5% who agree, 8.9% who disagree, 8.4% undecided, and 7.4% who strongly disagree. According to the study's findings, 75.3% of respondents either agree or strongly agree with the assertion that the multi-agency operation in Lamu County has clear command and control. Comparatively, 24.7% hold a different viewpoint. The evaluation of clear command and control yielded a mean score of 3.97, indicating that, on average, most respondents concur that there was clear command and power in the multi-agency operation in Lamu County. A low standard deviation of 1.248 indicates that the data collected was centred around the mean.

The results show a distinct chain of command and control in the multi-agency operation. It is crucial for agencies working together to have a clear line of power and authority to ensure the operation's success echoes these results [10]. Similar findings stated that specific command and control are necessary when numerous agencies participate in a process [9].

The ranking system of NPS and KDF became a topic of attention during the study on command and control. A respondent claims that when KDF and NPS officials collaborate in a multi-agency setting, it is essential to be clear about which level is equivalent. The NPS officer implied that KDF members think they are better than all NPS members, regardless of rank. For example, the rank badges for a senior superintendent in the NPS are comparable to those for a colonel in the KDF. The NPS Commissioner of Police, one level higher than the KDF colonel, believes he is superior to him in leadership. The respondent added that NPS sends police commissioners to the multi-agency operation in Lamu, where they are supposed to follow orders from the KDF colonel. Senior NPS officers, who think of themselves as having a higher status than KDF officers, become discouraged.

Proper Utilization of Resources. Resources are the material and intangible things needed to complete a specific task. Consequently, the efficient use of available resources is critical to the success of a multi-agency operation. The respondents were questioned about whether the multi-agency process in Lamu County is properly utilizing resources. According to the study's findings, which are presented in Table 2, the majority of respondents (39.4%) highly agree, while 21.2% agree, 16.3% disagree, 12.3% are undecided, and 10.8% strongly disagree. Over half of the respondents (60.6%) agreed that resources are appropriately used in the multi-agency operation. However, opinions on this point were mixed.

On the other hand, 39.4% of the survey participants disagreed. The element received an evaluation with a mean score of 3.62, indicating that, on average, most respondents agreed that resources are being used appropriately in the multi-agency operation in Lamu County. The data collected had a standard deviation that was slightly above average at 1.417, indicating that the data was dispersed.

The results show that resources are being used effectively in the multi-agency effort. These conclusions are supported by [8], who shared that effective resource management is crucial in multi-agency operations. A similar observation was made by [5], agreeing that resource management should be adaptable while working across sectors.

Multi-agency Staff Motivation. The success of a multi-agency operation depends on the level of energy, commitment, persistence, and inventiveness that employees bring to their work. The driven staff ensures they put in the effort and go above and beyond without being prodded. The responders were questioned about their motivation for performing their tasks throughout the multi-agency operation in Lamu. According to the study's findings, depicted in Table 2, most respondents (40.9%) disagree, followed by 35.5% who are undecided, 13.8% who agree, 5.9% strongly disagree, and 3.9% who strongly agree. In contrast to this study, when it is clear that most of the staff are not driven, they stressed the significance of staff motivation. Additionally, the author [2] mentioned that in any multi-agency operation, employee motivation should come first.

One of the respondents shared that while it is true that security officers swear to defend life and property, this does not mean that they should put their own lives in danger, mainly when the government does not express its appreciation for their effort. Security officers live in tents deep in the scary Boni forest. Therefore the living circumstances are pitiful, and the operation allowances paid are minute. Officers are not much motivated by their income at all.

Clear Aims and Objectives. Having specific goals and objectives is critical to assess whether your program is succeeding. They are intended to provide performance evaluation standards, direction and advice and inspire workers. When asked if the multi-agency operation in Lamu County had clear goals and objectives, the respondents' responses are shown in Table 2, with the majority of respondents (37.9%) strongly agreeing, 36.9% agreeing, 9.9% unsure, 7.9% strongly disagreeing, and 7.4% disagreeing. The results demonstrate that most respondents (74.8%) support the assertion that clear aims and objectives exist, while just 25.2% oppose them. The element was scored with a mean of 3.90, indicating that, on average, most respondents concur that the multi-agency operation in Lamu County has clear goals and objectives. The low standard deviation of 1.216 shows that the data was closely clustered around the mean. The World Health Organization's study from 2021 on greater collaboration for equitable and resilient recovery highlights the significance of having appropriate targets and objectives for any endeavour to succeed and shares similar findings.

Continuous Monitoring and Evaluation. Monitoring and evaluation are ongoing management processes that determine if the planned goals are being achieved, identify implementation obstacles, and draw attention to unintended consequences. The responders were questioned about whether the multi-agency operation in Lamu had ongoing monitoring and evaluation. This inquiry was designed to investigate whether monitoring and evaluation were being conducted. This is a crucial component of multi-agency leadership to examine whether the operations' aims and objectives are being met. According to the study's findings, which are depicted in Table 2, most respondents (49.8%) strongly agree; 30.5% agree; 10.8% disagree; 6.9% strongly disagree; and 2% are unsure. According to the study's findings, most respondents (80.3%) agree that monitoring and evaluation are ongoing, while 26.6% disagree. Monitoring and evaluation were estimated with a low standard deviation of 1.255, indicating that the data gathered was clustered around the mean, and a mean score of 4.05, indicating that, on average, most respondents agree that there is monitoring and evaluation in the multi-agency operation in Lamu County. The author [7] discovered that continuous monitoring and evaluation are crucial for the success of multi-agency operations and reached a similar conclusion. In their study to strengthen follow-up, monitoring, and evaluation, authors [4] also emphasized the value of monitoring and evaluation.

CONCLUSIONS

The study results showed that effective command and control were crucial components of the multi-agency leadership used in Lamu County. Resources were used effectively, and each agency understood the mission and goals of the operation. The multi-agency function in Lamu County was continuously monitored and evaluated. But the multi-agency process in Lamu County needs help with staff motivation, according to study findings.

According to the study, strong leadership and coordination have helped Lamu County increase its insecurity. The impact is seen in a decline in crime, a drop in IED and PSV attacks, and a notable improvement in the travel and education industries.

The author suggests creating a policy framework on involvement when several security agencies

are involved in multi-agency operations. This will make the multi-agency process run smoothly regarding command and control. It is also advised that a policy on the harmonization of operation allowances be put into place.

REFERENCES

1. Creswell, J. W. (2013). *Steps in conducting a scholarly mixed methods study*. Retrieved from https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1047&context=dberspeakers
2. Davidescu, A. A., Apostu, S.-A., Paul, A., & Casuneanu, I. (2020). Work Flexibility, Job Satisfaction, and Job Performance among Romanian Employees—Implications for Sustainable Human Resource Management. *Sustainability, 12*(15), 6086. doi: 10.3390/su12156086
3. Edwards, A. (2012). The role of common knowledge in achieving collaboration across practices. *Learning, Culture and Social Interaction, 1*(1), 22–32. doi: 10.1016/j.lcsi.2012.03.003
4. Fitzpatrick, P., & Williams, J. B. (2022). EIA in Canada: strengthening follow-up, monitoring and evaluation. In *Integrated Impact Assessment: Coming out of the Shadows?* (pp. 352–365). doi: 10.4337/9781800379633.00028
5. Gunawong, P., & Leerasiri, W. (2022). Information Sharing in Solving an Opium Problem: Multiple-Agency Management with Integration of Online and Offline Channels. *Sustainability, 14*(13), 8043. doi: 10.3390/su14138043
6. Huxham, C., & Vangen, S. (2005). *Managing to collaborate. The theory and practice of collaborative advantage*. London: Routledge.
7. Kabonga, I. (2019). Principles and Practice of Monitoring and Evaluation: A Paraphernalia for Effective Development. *Africanus: Journal of Development Studies, 48*(2). doi: 10.25159/0304-615x/3086
8. Koval, V., Mikhno, I., Udovychenko, I., Gordiichuk, Y., & Kalina, I. (2021). Sustainable Natural Resource Management to Ensure Strategic Environmental Development. *TEM Journal*, 1022–1030. doi: 10.18421/tem103-03
9. Skryabina, E. A., Betts, N., Reedy, G., Riley, P., & Amlôt, R. (2020). The role of emergency preparedness exercises in the response to a mass casualty terrorist incident: A mixed methods study. *International Journal of Disaster Risk Reduction, 46*, 101503. doi: 10.1016/j.ijdrr.2020.101503
10. Waring, S., Moran, J., & Page, R. (2020). Decision-making in multiagency multiteam systems operating in extreme environments. *Journal of Occupational and Organizational Psychology, 93*(3), 629–653. doi: 10.1111/joop.12309

The Effect of Instagram Content Quality on Fomsumerism Behavior with Emotional Response as a Mediating Variable

Nadya Betari Karlinda [1], **Sulhaini** [1], **Baiq Handayani Rinuastuti** [1]

[1] *University of Mataram*
Jl. Majapahit No 62 Mataram, Nusa Tenggara Barat, Indonesia

DOI: 10.22178/pos.89-10

JEL Classification: M10

Received 16.12.2022
Accepted 28.01.2023
Published online 31.01.2023

Corresponding Author:
Nadya Betari Karlinda
nadyabetari@gmail.com

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. Social media growth has changed consumer behaviour from offline consumption to online consumption. Social media provide opportunities for information sharing, and can routinely find out what others are doing and talking about. Instagram is a social media platform with visual elements and features that can provide a more comfortable space for social interaction and a stronger sense of community or connection between fellow users. The rapid growth of social media plays a vital role in creating feelings of fear of being left behind or fear of missing out (FoMO). FoMO behaviour can impact consumption and give rise to a new concept, "Fomsumerism". This study aimed to determine the effect of Instagram content quality on fomsumerism behaviour mediated by emotional response variables. This type of quantitative research uses non-probability sampling methods and purposive sampling techniques on 150 respondents. An online survey collected data and analyzed using SEM-PLS through the SmartPLS application version 3.9.9. The study results show that the quality of Instagram content positively and significantly affects fomsumerism behaviour. Emotional response as a mediating variable plays a partial mediation role so that the Instagram content quality variable can affect the fomsumerism variable directly or indirectly.

Keywords: Consumer Behavior; Instagram; Fomsumerism; Envy; Social Comparison; Imitation.

INTRODUCTION

Increased access to technology, especially social media, has made receiving information from users easier [6]. Instagram is one of the visual-based social media platforms that can provide a more comfortable space for social interaction and a stronger sense of community or connection between fellow users [9].

In its development, social media not only shapes consumption patterns but can cause emotional responses in its users, including envy of what they see [25]. It is easy to compare their own lives with the lives they see through visual content, and this can cause them to feel dissatisfied with their lives and behaviours [1, 23, 28, 32, 36] as well as tend to want to imitate their personality to be the same as they idolize [6, 10].

The rapid development of social media today also plays an essential role in giving rise to the fear of missing out (FoMO) [1, 4, 7]. From the beginning of its appearance, FoMO was defined as a fear of the experiences of others that he could not get and was characterized by a desire to constantly connect with what others were doing [31].

In the marketing context, FoMO behaviour can impact consumer behaviour and give rise to a new concept, "Fomsumerism" [3, 4]. The idea of fomsumerism is based on consumption behaviours that arise from the main emotional factors, including envy and social comparison. It can lead to consumption behaviours for fear of loss, conspicuous consumption, consumption to adjust habits (conformity consumption), consumption status, the need to be unique among others (need for uniqueness), too impulsive buying [3]. Indi-

viduals with FoMO tend to use the same product, even better or more than they see or others use. The above is in line with the research of [24] that consumers who have FoMO tend to make impulsive purchases.

Research by [30] states that the higher the user's dependence on Instagram, the stronger the perceived FoMO is characterized by, and the more intensively users search for the latest information related to other people's activities. Instagram's ease of access makes its users addicted, and often repeatedly open Instagram so that they have the potential to experience an intense FoMO. They tend to compare themselves with what they see on Instagram. What's more, Instagram posts by some users now tend to showcase the glamorous lifestyle by sharing exclusive experiences and often showing off their luxury goods. Due to the glamorous tendency of Instagram users, current Instagram posts can visually present a person's prosperity or wealth excessively.

FoMO has been widely applied for commercial purposes, but only some are interested in researching it for academic purposes [20]. FoMO research from the marketing perspective is still very little, so this study aims to see the relationship between the influence of Instagram content quality as a stimulus to forming fomsumerism behaviour. This research will build a comprehensive conceptual framework by adding emotional responses, including imitation, social comparison, and envy, as variables that mediate the relationship between Instagram content quality and fomsumerism to understand further the behaviour of consumers who have FoMO [5]. An understanding of FoMO behavioural tendencies associated with the use of social media can help marketers design designs and marketing strategies on social media [3].

Literature review

Instagram Content Quality. Instagram is a relatively new form of communication media where users can share their activities easily through photos and videos. Users have increased since its release last October 2010 [21]. Instagram has a more appropriate visual focus and supports interactions between fellow users [9].

The quality of Instagram content can be seen through two aspects, including the quality of message content consisting of photos and profiles, taking into account how to take pictures, as well as paying attention to the colour and sharpness of images, as well as the credibility of endorsers, through attractiveness, trustworthiness, expertise or level of knowledge of a product and similarity. Instagram is a trendy social media platform because it offers high and attractive visual quality, so it can lead its users to the fear of missing out if used with high intensity [15]. Instagram users are successfully stimulated to make impulsive purchases by seeing creative visual content uploaded by users, brands, and endorsers, compared to posts done excessively in terms of numbers [11]. The impulsive buying behaviour above is one of the characteristics of fomsumerism proposed by [3], so the hypothesis in this study can be formulated as follows: H1 – The better the quality of Instagram content, the stronger the fomsumerism.

Emotional Response. In the context of this study, it will examine the influence of social media on the formation of emotional responses in its users, including:

1. Imitating, Imitative behaviour tends to target at a young age. They desire their personality to be the same as they idolize [10].

2. Social comparison leads to the formation of social levels and tends to use the comparative dimension between inferior-superior and weaker-stronger [2]. The research of [32] explained that social comparison occurs when people compare themselves with abilities or characters that they consider essential.

3. Envy is a feeling of dissatisfaction and leads to bad intentions towards the happiness, success, reputation, and achievements of others [25].

About social media, research by [37]) shows that the combination of colours in photo posts on Instagram can affect emotions in the form of passion and excitement from the perspective of Instagram users. Based on the research above, a hypothesis can be formulated as follows: H2 – The better the quality of Instagram content, the stronger the emotional response

Fomsumerism. The FoMO phenomenon has spread mainly in social media, although several controversies come with it [3]. FoMO is a feeling characterized by always wanting to connect and know what the other person is doing. For people who have FoMO, actively participating in various social media is an exciting thing [31] because dif-

ferent social media platforms, one of which is Instagram, play an essential role in the formation of FoMO and provide space for everyone to see whatever activity was uploaded on it [1, 3, 4, 7]. FoMO is used commercially to stimulate demand from young and adult consumers, which refers to an invitation to engage in an activity of colleagues, friends or family through social media.

The concept of fomsumerism emphasizes a relationship between consumption patterns and FoMO, which leads to conspicuous consumption patterns, always wanting to be seen by others, showing symbols and social status, to purchases made by users because of the invitation of colleagues on social media. The behaviour of fomsumerism in individuals leads to the following buying behaviour [3]:

1. Consumption due to fear of missing out.

2. Conspicuous consumption to stand out in a social group.

3. Make consumption or purchases to adjust habits in a social group (conformity consumption).

4. Make consumption or purchases to look unique in a social group (need for uniqueness).

5. Consuming because you want to have a social status equivalent to a social group (consumption status).

6. Impulsive and unplanned consumption (impulsive buying).

Research by [3] states that emotional responses are a factor causing fomsumerism, including envy as something that is seen as being able to encourage individuals to participate in activities that are also followed by others. In addition, social comparison is also one of the factors that trigger consumption. Social comparison factors influence purchasing decisions and behaviour [3]. Another form of emotional response that is thought to lead to the characteristics of fomsumerism is the tendency to imitate to have a personality or ownership of goods similar to idols or people considered influential [10, 27]. Based on this, a hypothesis can be formulated as follows: H3 – The more robust the emotional response, the stronger the fomsumerism.

A conceptual research framework can be assembled based on the hypothesis formulation above (Figure 1).

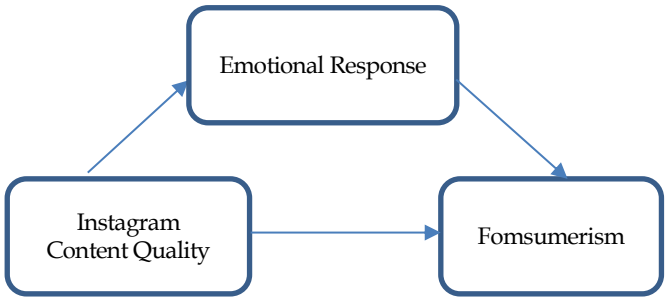


Figure 1 – Conceptual Framework

METHOD

This study uses a quantitative approach using non-probability sampling and purposive sampling techniques, where it is limited to certain types of people having the following criteria:

1. Always follow the development of Instagram social media and make it a source of information on the products to be purchased;

2. Aged 20 – 49 years old.

In a study using SEM (Structural Equation Modelling), according to [17], one method of determining the sample size for SEM is multiplying 5–10 times the number of indicators of the entire variable. Then the maximum sample size is 10 x 15 or 150, so the number of samples in this study can be determined to be 150 respondents throughout Indonesia. The data collection technique in this study was carried out using a questionnaire with a Likert scale of 1–7, each representing the respondents' opinions. Data was collected through an online survey with a questionnaire made in a Google Form and disseminated through the social media networks Whatsapp group and Instagram. The questionnaire consists of 2 parts. The first part contains the respondent's identity consisting of full name, domicile area, gender, occupation, age, monthly income (in rupiah), education, and luxury fashion purchased. At the same time, the second part contains statement items, namely 17 statement items for Instagram content quality variables, 8 for emotional response variables and 20 for fomsumerism variables. The validity test was conducted with the SPSS program version 28.0.1.1 with a sample number of 30 outside the study respondents. Hypothesis test using SEM-PLS Analysis using SmartPLS application version 3.2.9 consists of two sub-models, namely the measurement model or the so-called outer model and the structural model, often called the inner model.

RESULTS AND DISCUSSION

Characteristics of Respondents. The characteristic of respondents in this study was that women dominated as many as 150 samples by 78%. The majority of respondents had a bachelor's education background, 78.67%. Most of the respondents were young respondents, namely 20-30 people, a total of 112 people (74.67%)

Evaluation of Measurement Model/Outer Model. Measurement model or outer model was carried out on all variables involved in this study, namely independent variables or exogenous variables, namely the quality of Instagram content towards dependent variables or endogenous variables of fomsumerism. The Outer model is measured by convergent validity, discriminant validity, and internal consistency reliability. This model is called a reflective measurement model by evaluates the value of loading factor, composite reliability, Cronbach's alpha, AVE and discriminant validity. The rule of thumb for the loading factor commonly used to measure convergent validity is ≥ 0.7 with an average variance extracted (AVE) value of ≥ 0.5 [17]. If an outer loading value is found below 0.7, researchers should carefully examine the effect of item removal on composite reliability as well as on the validity of the construct contents. Generally, indicators with outer loading between 0.40 and 0.70 should be considered to be removed from the scale only when removing these indicators leads to increased composite reliability [17]. The following are the results of the outer loading analysis phase II (re-estimated) after eliminating one by one on indicators whose external loading value is below 0.7 as follows.

Table 1 – Correlation value (outer loading) and AVE

Variable	Indicator	Outer Loading
Instagram Content Quality (X)	I always give likes and comments on the content of products I like	0.704
	Saya selalu melakukan repost terhadap konten produk yang saya sukai	0.889
	I always include the same hashtags used in the content of those products when I post about products I like (re-hashtagging)	0.880
	I like content involving endorsers who have appeal	0.785
	I always repost the content of the products I like	0.725
Emotional Response (Z)	I buy luxury fashion out of curiosity at each of its latest releases	0.903
	I bought a luxury fashion because I was anxious that I would miss this opportunity	0.911
	I buy luxury fashion so that the social groups around me still view me as an essential or influential person	0.906
	I buy luxury fashion because I want to look rich	0.709
	I buy luxury fashion to look experienced	0.889
	I always wanted to have the same fancy fashion as my friends or idol/artists have	0.884
	I always follow the trend of using luxury goods around me	0.836
Fomsumerism (Y)	I bought a luxury fashion because I was anxious that I would miss this opportunity	0.796
	I buy luxury fashion so that the social groups around me still view me as an essential or influential person	0.889
	I buy luxury fashion because I want to look rich	0.928
	I buy luxury fashion to look experienced	0.898
	By buying luxury fashion that not many people have, I feel valued	0.895
	Buying luxury fashion as my friend purchased made me get closer to them	0.893
	For me, it is essential to look at luxury fashion in front of others	0.854
	When I am confused about determining the choice of product, I will choose the product based on what others buy	0.753

Variable	Indicator	Outer Loading
	I buy luxury fashion to reflect my social status	0.902
	If there is a new release, I will buy it to maintain my social status	0.925
	I am willing to pay more for a luxury fashion to improve my social status	0.931
	In my opinion, luxury fashion has value and can improve my social status	0.835
	I buy luxury fashion without considering it first	0.768

From the reliability test results, the value of Cronbach's Alpha (α) on the three variables, including Instagram content quality, emotional response, and fomsumerism, was respectively 0.881; 0,925; 0.974 so all variables are declared reliable because their values are more than 0.7 with the highest reliability value in variable Y (fomsumerism).

Evaluation of Structural Model /Inner Model. Testing of structural models is carried out by looking at the value of R-Square, which is a goodness-fit-model test. The R-Square value describes how much an independent variable can explain a dependent variable.

From the output results of the R-Square value, it can be concluded that the model of the influence of independent variables on dependent variables has an R-Square of 0.746. This value shows that the Instagram content quality construct variable can explain the fomsumerism construct variable of 74.6%. In comparison, the other 25.4% is influenced by other factors not included in this study. It can be concluded that R Square Y is a medium structural model [17].

The next test is the estimation of path coefficients which is carried out to see the significance of the influence of independent variables on dependent variables by looking at the value of the parameter coefficient and the value of t-statistical energy. This test is carried out by calculating using PLS Boothstrapping according to the model (Figure 2).

To assess the significance of the prediction model in structural model testing can be seen from the statistical t- value between the independent variable to the dependent variable. According to [17], the significance value of the 5% level must meet the t-value of 1.96. The t-statistic value obtained is seen in the Path Coefficient table in the SmartPLS output as per Table 2.

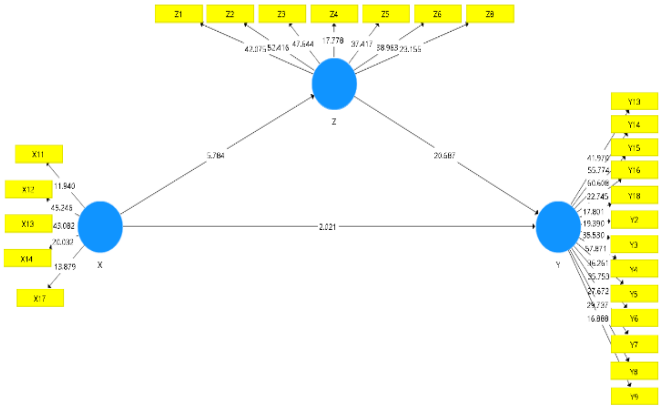


Figure 2 – Model of Path Coefficient with PLS Bootstrapping

Table 2 – The t-statistic value obtained is seen in the Path Coefficient

Influence Between Variables	t-statistic	Weight significance	P-value
Instagram Content Quality -> Fomsumerism	2,021	> 1,96	0,044
Instagram Content Quality -> Emotional Response	5,784	> 1,96	0,000
Emotional response -> Fomsumerism	20,687	> 1,96	0,000

Based on the table above, all hypotheses have a t statistics value of more than 1.96 and P Values of less than 0.05, so it can be interpreted that the three views are accepted and have a positive and significant influence.

The descriptive analysis of variables in this study also showed that respondents liked the content that could present aesthetic and attractive visuals. Author [26] also confirms that luxury goods on Instagram content become more expressive and aesthetic because the creativity and authen-

ticity of the range support it. Respondents also stated that endorsers have an essential part and role in the Instagram content of luxury fashion. This is in line with the research of [14], which states that endorsers who have popularity can form trust in the eyes of consumers and indirectly encourage consumers to consume luxury fashion unplanned. In addition to buying luxury fashion unplanned, respondents tend to another characteristic of fomsumerism, namely buying luxury fashion to look unique, attractive, and different from others. This is supported by the research of [13], who explains that the role of Instagram strengthens the needs of consumers who want to look unique (need for uniqueness). One of the criteria for luxury goods is their uniqueness, and can be a differentiator from other individuals [8]. By using luxury fashion, they can show their unique and different personal tastes but not aim to look striking [35].

This study also showed the tendency of respondents to compare themselves by always paying attention to the trend of luxury fashion consumption around them. Still, respondents expressed disapproval of the feelings of envy and inferiority that arise. This is in line with previous research conducted by [29], which showed that the better the combination of all visual elements, both audio, verbal, and visual, and the role of the endorser used, the more evocative a content is and the stronger the formation of an emotional response in the form of self-comparison with something better (upward social comparison).

The tendency of respondents to behave as fomsumerism is seen in unplanned purchases and wanting to look unique due to the formation of social comparison in respondents, which is characterized by always paying attention to the trend of luxury fashion consumption around them. This supports research by [34], which state a relationship between social comparison and impulsive buying. The results showed that young respondents were accustomed to making impulsive purchases and compared themselves to what they saw on social media, driven by a strong desire to have something like others. The unique character of luxury goods also strengthens the above, so having them can make respondents look different from others [8]. Social comparison has also been shown to influence the formation of other fomsumerism characteristics, namely the need for uniqueness [22]. Respondents bought luxury fashion that highlighted uniqueness and used it uniquely. Most respondents' characters in the [22] study used an elegant but discreet manner to still show their peculiarities in their social environment.

CONCLUSIONS

The quality of Instagram content has a positive and significant effect on fomsumerism. The higher the quality of Instagram content, the higher the fomsumerism. Most respondents like content that can present aesthetic and attractive visuals. Instagram content that posts luxury goods will be more interesting if this content is presented in verbal, visual or audio form because it will further increase consumer attention and interest. Endorsers also have an essential part and role in luxury fashion Instagram content because they have integrity and can be trusted. Famous endorsers can form trust in the eyes of consumers and indirectly encourage consumers to consume luxury fashion unplanned. Instagram also strengthens the needs of consumers who want to appear and look unique (need for uniqueness). By using luxury fashion, they can show their unique and different personal tastes but not aim to stand out.

The quality of Instagram content significantly influences emotional responses, meaning that the higher the quality of Instagram content, the stronger the emotional response that is formed in the respondents. Most respondents compared themselves by always paying attention to the consumption trends of luxury fashion around them. Novel content and aesthetics inspire and motivate everyone who sees it. The more evocative the content is, the stronger the emotional response is formed in self-comparison with something considered better (upward social comparison).

The emotional response positively and significantly influences fomsumerism, meaning that the stronger the emotional response causes, the higher the fomsumerism. The tendency of respondents to behave in fomsumerism can be seen from the visible characteristics, namely unplanned purchases and wanting to look unique due to the formation of social comparisons in the respondents, which is marked by always paying attention to the consumption trends of luxury fashion around them. The stronger the social comparison appears in the respondent, the more impulsive the respondent is in purchasing, especially among young respondents. They are used

to making impulsive purchases and comparing themselves to what they see on social media, and they are driven by a strong desire to have something like others have. The above is also reinforced by the unique character of luxury goods so that owning them can make respondents look different from others. The majority of the respondents' feelings use luxury fashion to show their uniqueness to their social environment, not to look rich or flashy.

REFERENCES

1. Abel, J. P., Buff, C. L., & Burr, S. A. (2016). Social Media and the Fear of Missing Out: Scale Development and Assessment. *Journal of Business & Economics Research*, 14(1), 33–44. doi: 10.19030/jber.v14i1.9554
2. Allan, S., & Gilbert, P. (1995). A social comparison scale: Psychometric properties and relationship to psychopathology. *Personality and Individual Differences, 19*(3), 293–299. doi: 10.1016/0191-8869(95)00086-l
3. Argan, M., & Argan, M. T. (2019). Toward A New Understanding Of Fomo: 'Fomsumerism'. *Pazarlama Teorisi ve Uygulamaları Dergisi, 5* (2), 277–302.
4. Argan, M., & Tokay-Argan, M. (2018). Fomsumerism: A Theoretical Framework. *International Journal of Marketing Studies, 10*(2), 109. doi: 10.5539/ijms.v10n2p109
5. Argan, M., Tokay Argan, M., & İpek, G. (2018). I Wish I Were! Anatomy of A Fomsumer. *Journal of Internet Applications and Management, 9*(1), 43–57. doi: 10.34231/iuyd.407055
6. Athar, H. S. (2020). The Impact of Marketing Mix on the Purchase Decision When Borrowing Consumer Loans. *Amwaluna: Jurnal Ekonomi Dan Keuangan Syariah, 5*(1), 40–49. doi: 10.29313/amwaluna.v5i1.6615
7. Barry, C. T., & Wong, M. Y. (2020). Fear of missing out (FoMO): A generational phenomenon or an individual difference? *Journal of Social and Personal Relationships, 37*(12), 2952–2966. doi: 10.1177/0265407520945394
8. Batat, W. (2019). How Millennials and Post-millennials Are Reshaping Luxury. *Management for Professionals*, 187–210. doi: 10.1007/978-3-030-01671-5_10
9. Blight, M. G., Ruppel, E. K., & Schoenbauer, K. V. (2017). Sense of Community on Twitter and Instagram: Exploring the Roles of Motives and Parasocial Relationships. *Cyberpsychology, Behavior, and Social Networking, 20*(5), 314–319. doi: 10.1089/cyber.2016.0505
10. Chan, K., & Prendergast, G. P. (2008). Social comparison, imitation of celebrity models and materialism among Chinese youth. *International Journal of Advertising, 27*(5), 799–826. doi: 10.2501/s026504870808030x
11. Djafarova, E., & Bowes, T. (2021). 'Instagram made Me buy it': Generation Z impulse purchases in fashion industry. *Journal of Retailing and Consumer Services, 59*, 102345. doi: 10.1016/j.jretconser.2020.102345
12. Djafarova, E., & Rushworth, C. (2017). Exploring the credibility of online celebrities' Instagram profiles in influencing the purchase decisions of young female users. *Computers in Human Behavior, 68*, 1–7. doi: 10.1016/j.chb.2016.11.009
13. Drążkowski, D., Pietrzak, S., & Mądry, L. (2022). Temporary change in personality states among social media users: effects of Instagram use on Big Five personality states and consumers' need for uniqueness. *Current Issues in Personality Psychology, 10*(1), 32–38. doi: 10.5114/CIPP.2021.110938
14. Gentina, E., Chen, R., & Yang, Z. (2021). Development of theory of mind on online social networks: Evidence from Facebook, Twitter, Instagram, and Snapchat. *Journal of Business Research, 124*(February), 652–666. doi: 10.1016/j.jbusres.2020.03.001

15. Gezgin, D. M., & Mihci, C. (2020). Smartphone Addiction in Undergraduate Athletes: Reasons and Effects of Using Instagram Intensively. *International Journal of Technology in Education and Science, 4*(3), 188–202. doi: 10.46328/ijtes.v4i3.106

16. Good, M. C., & Hyman, M. R. (2020). Direct and indirect effects of fear-of-missing-out appeals on purchase likelihood. Journal of Consumer Behaviour, 20(3), 564–576. doi: 10.1002/cb.1885

17. Hair, Joe F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review, 26*(2), 106–121. doi: 10.1108/EBR-10-2013-0128

18. Hair, Joe F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science, 40*(3), 414–433. doi: 10.1007/s11747-011-0261-6

19. Hair, Joseph F., L.D.S. Gabriel, M., da Silva, D., & Braga Junior, S. (2019). Development and validation of attitudes measurement scales: fundamental and practical aspects. *RAUSP Management Journal, 54*(4), 490–507. doi: 10.1108/RAUSP-05-2019-0098

20. Hodkinson, C. (2016). 'Fear of Missing Out' (FOMO) marketing appeals: A conceptual model. *Journal of Marketing Communications, 25*(1), 65–88. doi: 10.1080/13527266.2016.1234504

21. Hu, Y., Manikonda, L., & Kambhampati, S. (2014). A First Analysis of Instagram Photo Content and User Types. *Frontiers of Mathematics in China, 12*(1), 247–260.

22. Jebarajakirthy, C., & Das, M. (2021). Uniqueness and luxury: A moderated mediation approach. *Journal of Retailing and Consumer Services, 60*(February), 102477. doi: 10.1016/j.jretconser.2021.102477

23. Jiang, S., & Ngien, A. (2020). The Effects of Instagram Use, Social Comparison, and Self-Esteem on Social Anxiety: A Survey Study in Singapore. *Social Media and Society, 6*(2). doi: 10.1177/2056305120912488

24. Karapinar, I., Eru, O., & Cop, R. (2019). The Effects of Consumers' FoMo Tendencies On Impulse Buying and The Effects of Impulse Buying on Post- Purchase Regret: An Investigation on Retail Stores*. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, *10*(3), 124-138.

25. Krasnova, H., Widjaja, T., Buxmann, P., Wenninger, H., & Benbasat, I. (2015). Why following friends can hurt you: An exploratory investigation of the effects of envy on social networking sites among college-age users. *Information Systems Research, 26*(3), 585–605. doi: 10.1287/isre.2015.0588

26. Kusumasondjaja, S. (2019). Exploring the role of visual aesthetics and presentation modality in luxury fashion brand communication on Instagram. *Journal of Fashion Marketing and Management, 24*(1), 15–31. doi: 10.1108/JFMM-02-2019-0019

27. Lansu, T. A. M., Cillessen, A. H. N., & Karremans, J. C. (2015). The Effects of Social Status and Self-Esteem on Imitation and Choice of a Popular Peer. *Journal of Relationships Research, 6*, 1–11. doi: 10.1017/jrr.2015.11

28. Lup, K., Trub, L., & Rosenthal, L. (2015). Instagram #Instasad?: Exploring Associations Among Instagram Use, Depressive Symptoms, Negative Social Comparison, and Strangers Followed. *Cyberpsychology, Behavior, and Social Networking, 18*(5), 247–252. doi: 10.1089/cyber.2014.0560

29. Meier, A., Gilbert, A., Börner, S., & Possler, D. (2020). Instagram inspiration: How upward comparison on social network sites can contribute to well-being. *Journal of Communication, 70*(5), 721–743. doi: 10.1093/JOC/JQAA025

30. Munawaroh, E., Nurmalasari, Y., & Sofyan, A. (2020). Social Network Sites Usage and Fear of Missing Out among Female Instagram User. *Proceedings of the 2nd International Seminar on Guidance and Counseling 2019 (ISGC 2019)*. doi: 10.2991/assehr.k.200814.031

31. Przybylski, A. K., Murayama, K., Dehaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior, 29*(4), 1841–1848. doi: 10.1016/j.chb.2013.02.014

32. Steers, M. L. N., Wickham, R. E., & Acitelli, L. K. (2014). Seeing everyone else's highlight reels: How Facebook usage is linked to depressive symptoms. *Journal of Social and Clinical Psychology, 33*(8), 701–731. doi: 10.1521/jscp.2014.33.8.701

33. Sudiartha Athar, H., Josman, L. F., & Hermanto. (2020). Foreign Tourist's Food Preferences In Lombok: A Qualitative Research In Customer Behavior. *Dinasti International Journal of Digital Business Management, 1*(3), 444–453. doi: 10.31933/dijdbm.v1i3.254

34. Vazquez, D., Wu, X., Nguyen, B., Kent, A., Gutierrez, A., & Chen, T. (2020). Investigating narrative involvement, parasocial interactions, and impulse buying behaviours within a second screen social commerce context. *International Journal of Information Management, 53*(September 2019), 102135. doi: 10.1016/j.ijinfomgt.2020.102135

35. Wang, J., & Foosiri, P. (2018). Factors Related to Consumer Behavior on Luxury Goods Purchasing in China. *International Journal of Business and Economics, 10*(1), 19–36.

36. Yang, C. C. (2016). Instagram Use, Loneliness, and Social Comparison Orientation: Interact and Browse on Social Media, but Don't Compare. *Cyberpsychology, Behavior, and Social Networking, 19*(12), 703–708. doi: 10.1089/cyber.2016.0201

37. Yu, C. E., Xie, S. Y., & Wen, J. (2020). Coloring the destination: The role of color psychology on Instagram. *Tourism Management, 80*,104110. doi: 10.1016/j.tourman.2020.104110

Forms of Non-Standard Employment in the Context of the Transformation of Business Processes in Modern Conditions

Maryna Pravdiuk [1]

[1] *Vinnytsia National Agrarian University*
3 Sonyachna Street, Vinnytsia, 21000, Ukraine

DOI: 10.22178/pos.89-24

JEL Classification: E24

Received 10.12.2022
Accepted 20.01.2023
Published online 31.01.2023

Corresponding Author:
Pravd18@gmail.com

© 2023 The Author. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. Modern business is dynamic and requires flexibility and quick response to societal changes. The conditions for forming market relations in Ukraine, characterised by the influence of a dynamic external environment and the growth of competition, require the search for innovative means of survival of enterprises and maintaining their efficiency. The purpose of the article is to study and summarise the theoretical aspects of the outstaffing process to identify the opportunities and threats associated with the participation in it of all subjects of this process, organisational and legal aspects of outstaffing, taking into account which will ensure the possible benefits of its implementation. Based on the analysis of literary sources and the study of practical experience in providing outstaffing services in Ukraine, the content of this process is determined. It is determined that outsourcing is one of the methods of cost optimisation at the present stage of enterprise development. The main scientific approaches to the definition of this concept, the classification of types are considered, and the main advantages and disadvantages of its use with an increase in the efficiency of the enterprise. The theoretical foundations of outsourcing in the enterprise are analysed to reduce production costs, improve quality and increase product competitiveness. Arguments have been formulated about recognising this toolkit as an effective means of minimising the costs of the enterprise, and some additional advantages of its use in a crisis economy are given. The main problems of regulating legislative and regulatory requirements for providing outstaffing services in Ukraine in current economic conditions are investigated. Explored outsourcing helps new and established businesses attract more professional employees by transferring their business processes to service providers with safer and more advanced technologies. The use of atypical forms of employment undoubtedly has its advantages, but the implementation process is hampered since it is not fully regulated by law. In general, it is necessary to study the specifics of outsourcing and outstaffing since these are promising ways to solve enterprise personnel problems.

Ключові слова: non-standard employment; forms of work; business; business processes; outsourcing; outstaffing.

INTRODUCTION

The rapid development of information technologies and large-scale digitalisation of socio-economic relations in society have significantly influenced and continue to change approaches to doing business, forcing companies to reconsider management approaches and actively implement an effective policy for optimising business processes. Thanks to the economic development of competition, modern enterprises promote new management tools, one of which is outsourcing. It is necessary to finance and human resources competent employees, but in the conditions of COVID-19, and the introduction of martial law in connection with russian aggression, the business is looking for ways to optimise financial resources. Transaction costs have undergone significant revision to save the company. Their reduction allows you to focus directly on operational activities. At the same time, it is possible to delegate other processes to third parties – outsourcers. Outsourcing is moving a business function performed within an organisation for a third-party business provider of operations. This means that the service or production is per-

formed within the organisation, and another organisation performs the pen.

The main factors determining competitiveness are organisational (including managerial) and technological, as well as such characteristics of human resources as skills and abilities, qualifications, and motivation of employees. The combination of these factors determines the resilience and adaptability of a business entity in a competitive environment, and profit indicators are the ultimate goal of survival in a competitive environment.

Ensuring competing positions in the enterprise should be achieved due to high-performance efficiency, which is ensured through the introduction of modern technologies and qualified personnel, as well as due to the ability to maintain a leading position in the market, which in turn is ensured through the introduction of several marketing activities. One of the measures that can improve the situation in the enterprise is the choice of effective tool management of strategic analysis. Collateral occurs through the selection of certain criteria in the aggregate of the relevant tools. So, the choice of an effective tool for generating strategic management directly depends on the enterprise's development level and the goals that are implemented [1].

RESULTS AND DISCUSSION

Outsourcing arose as a response to the requirements of the world market; it is based on an important principle of an efficiently organised economic system — the principle of division of labour. Thanks to the development of the market, it became possible to concentrate all resources on the main activity of the enterprise and transfer auxiliary functions to a reliable and professional partner [2]. Sourcing models are modern ways of doing business, the direct content of which is the attraction of third-party resources. Thanks to their use, many companies have the opportunity to reduce their costs, pay more attention to basic business operations and get new ideas [3].

With the development of technology and entrepreneurship, various models appeared: outsourcing, no sourcing, crowdsourcing, etc.; in the development process, the concept of a "sourcing model" was created, which is used in many areas. Its importance lies in the fact that it is the main factor and model of development of the company's activities to attract external resources to improve the company's activities and solve specific business problems [4].

Americans were the first to use the concept of "outsourcing." And it all started with the appointment in the 20s of the 19th century of Alfred Sloan as CEO of General Motors, who aimed to repel part of the market from Henry Ford - the main competitor of G. M. Sloan was enlightened by the idea that the company should focus on its main functions, and auxiliary ones can be "put on the side", thereby significantly reducing the level of costs and optimising business processes. He was the first to come to this conclusion. In the future, such a transfer of non-profit functions to a specialised third-party company began to be called outsourcing (from the English outsourcing – using an external source) [5].

There is a discussion between scientists about when outsourcing began [6]. According to Corbett (2004), although the outsourcing phenomenon appeared in the United States around 1970, the date still needs to be scientifically recorded. Amity and Wei (2004) noticed that outsourcing was first mentioned in the context of the automotive industry in 1979 in the Journal of the Royal Society of Art, vol. CXXVII, 141/1. The article cited the British auto industry representatives' decision to transfer some works to German specialists. Bloomberg (1998) argues that outsourcing came from the IT sector in 1980. Gerble et al. (2009) discussed its origins, concluding that outsourcing existed in industry and the service sector. The first arose in the industrial sector when manufacturers began to transfer some activities to subcontractors. Outsourcing of services appeared later, starting with specialised legal activities, and then outsourcing of IT services. Bakanauskienė and Brasaitė (2011) note that there is more than a decade of literature by scientists on management, which analyses the process by which certain management functions, actions and processes that were previously performed within the organisation are transferred to external companies [6].

In modern economic conditions, market relations are developing so dynamically that all enterprises, institutions and organisations are forced to keep up with the times. Freelancers are a kind of differential, tracking which is one of the important places to increase economic and financial leverage. Thus, it is known that now more than 60% of companies in Ukraine have been corrupted or have never benefited from the services of

removing personnel for the state. And this digital continues to grow. Such a freelance hiring servant is also popular in many communities in the United States and Europe. Their management has long discovered many advantages of outsourcing and outstaffing. Note that the modern concepts of "outsourcing" and "outreach" correspond to all the necessary required staff control over the help of my company outsourcer and also frees up time to solve the problems of the primary personnel - outsourcing and outstaffing a particular relationship between the organisation and the employee [7].

One of the atypical forms of employment is outstaffing. The term "outstaffing" is still not used in Ukrainian regulations but is actively used, as a rule, by recruitment agencies. The word "outstaffing" comes from English words (out – "outside", staff – "state") and means, in fact, this. Within the framework of an outstaffing contract, an employee is withdrawn from the state (or is not on staff) of the customer company and is registered in the staff of the contractor company. At the same time, such an employee continues to work in the same place (in fact) and perform their former duties, but the duties of the employer in relation to it are already performed by the contractor company [8].

Outstaffing is the withdrawal of some employees outside the client's organisation and transferring them to a recruitment agency that formally performs the functions of an employer for them. Still, they continue to work in their company [9]. I.O. Herashchenko and G.P. Dombrovska understand outstanding as the purchase of a service that is not a necessary running company in a specific period of time [10]. Under an outstaffing contract, the contractor provides employees with whom he is in an employment relationship to the customer for further use by the latter of their work in their business activities on apar with their own employees, and the customer undertakes to accept this service and pay for it by organising borrowed labour to ensure compliance with the law [11].

In the case of outstaffing, you are asking some outsourcing agency to provide you with one or more employees who will join your team and follow your guidance. They stay on partners' salaries, but you more or less fully manage their tasks. This means that they become an extension of your team.

Another form of non-standard form of employment is outsourcing. In the Oxford English Dictionary, the verb "outsource" is defined as "to receive something from an external organisation or area by a contract, to enter into a contract"[12]. The term "outsourcing" comes from the English outside resource using – "use of external resources". In world business practice, writes V. G. Fast, this term called understanding the sequence of organisational decisions, the essence of which is to transfer some solutions independently implemented by the organisation of functions or type in the activities of the external organisation [13]. According to N. Zagriy, outsourcing was recognised as a business strategy back in 1989, and today it is becoming the most common model for ensuring the development of companies. Experience shows that those who at least once tried to outsource the company's business processes no longer return to the standard model of labour relations.

Nevertheless, this phenomenon is treated with a touch of scepticism in the post-Soviet space. This usually applies to large enterprises, where the manager wants to see a specialist at his side. Such demand gives rise to "outstaffing" [14].

The essence of outsourcing is to improve the efficiency of the company and the release of resources by transferring individual non-core functions to third-party specialised companies to focus on the company's main activity and its further development and expansion. The decision to introduce outsourcing in the enterprise is made by the top management and is also included in the enterprise's corporate strategy [15].

Improving quality is the most traditional goal of outsourcing because the classic slogan "we keep ourselves what we do better than others, pass on to the external performer what he does better than others" implies, firstly, concentrating efforts on improving the quality of the product (process), which is a new competitive advantage, and secondly, attracting a more professional business entity. Accordingly, quality improvement can be used by you: a) your efforts; b) the professionalism of the supplier. Depending on these criteria, the supplier choice and the relationship design will also be somewhat different. In the first case, there is a transfer of already developed processes, and their specialists are engaged in improving and developing new projects. In the second case, the supplier develops new systems and creates

an innovative approach, which is transferred to the customer [16].

The most significant impact on the development of outsourcing on a global scale was revealed by such processes: as technology – complexity, location and nature of services that can be used in outsourcing. All these criteria have reached a colossal scale and continue their development, expanding the possibilities of their application, for business; internationalisation – increased political and regulatory stability, improved education of the workforce, reduced resistance (and sometimes even aspirations) to mobility, the introduction of cloud and mobile solutions; economic and political factors – the need to adhere to the established budget in the state sectors of the economy, strengthening the requirements for assessing the risks of financial services [17].

There are the following types of outsourcing: professional outsourcing (specialised services, legal, accounting, etc.), multisourcing, IT outsourcing, specialised outsourcing, applied to specific business processes, business process outsourcing, production outsourcing, project outsourcing, operational outsourcing, local outsourcing, and offshore outsourcing. These types of outsourcing of NSU are associated with the attraction of valuable resources for the development of the customer's business, for example, outsourcing of business processes, outsourcing of human resources: transaction processing, supply management, administrative support, legal or bugler services, without a pitch, technological support of e-commerce, etc. [18].

Outsourcing as a form of subcontracting acts as a technology for creating highly efficient and competitive organisations with a consistent concentration of management based on the formalisation of business processes related to the design, production, operation and maintenance. This allows you to gain competitive advantages through external communications and the ability to manoeuvre resources quickly. Outsourcing relations are structured based on transactions, the terms of which may provide for different forms of organisation of activities from an economic and legal point of view. The form of partnership depends on the customer's choice, the distribution of responsibility and risks between the customer and the contractor [19].

Guided by the essential aspects of outsourcing – building business relations at the level of "orderer–performer", the following models of outsourcing singing are distinguished: horizontal (American), pyramidal (Japanese) and mixed. In contrast to the flat model, according to which a more significant number of performers are used to solve one supplied problem, the pyramidal model provides for a longer-term half-work for the future with the possibility of developing industry and intersectoral clusters. At the same time, in the practice of outsourcing European countries, including Ukraine, there is a mixture of pyramidal and horizontal models [20].

One of the main obstacles to the active implementation of outsourcing in Ukrainian enterprises is the need to define outsourcing processes and their regulatory right to regulate, control and be responsible for violations. According to Art. 6 of the Civil Code of Ukraine, "the parties have the right to conclude an agreement that is not transferred by acts of civil law, but complies with the general principles of civil law" [21].

And already in Art. 627 "the parties are free in the conclusion of the day's agreement, the choice of the counterparty and the recognition of the terms of the contract, taking into account the requirements of the Code, and other acts of civil law, customs in business turnover, the requirements of reason and justice" [21].

Previously, we have already emphasised that outsourcing cannot be attributed to standard employment, and this sees specific problems of its legal regulation because standard employment is the full employment of an employee on working hours, which is equal to the norm established by law or an employment contract, with remuneration in proportion to the time performed by the labour function and official duties. This distinctive feature of non-standard employment is the atypical duration of working time, the location of the workplace, tasks, functions and other conditions of the employment contract. In turn, the Labor Code of Ukraine provides several non-standard forms of employment: flexible working hours, home-based work, dis-dancing work, and part-time work. At the same time, such forms of employment as networking, platform work of services for the delivery of goods and transportation of passengers (Uber, Glovo, Bolt, Wolt, Raketa), coworking, outstaffing, outsourcing, R&D activities offices and other forms of employment under civil law contracts are not provided for either by the Labor Code of Ukraine or by the Civil Code of Ukraine. Attempts to consolidate at least partially the ser-

vices for the provision of personnel by one business entity to another to further develop their tasks were carried out in Article 39 of the Law of Ukraine "Pro employment of the population" and subparagraph 14.1.183 of the Tax Code of Ukraine [22].

Non-standard forms of employment in today's conditions are quite an effective means of developing business in Ukraine. In today's needs, the well-known expression "Time is money" is more relevant than ever to the pen of a prominent American politician and scholar, Benjamin Franklin. In a general sense, he noted that you should not waste time for which you can earn money. We believe that using outstaffing in outsourcing will give any business strategy a significant acceleration of implementation. When using these forms, the company receives the specialised experience of those involved and, most importantly, professional professionals who work quickly and efficiently. Each professional involved from the outside will undoubtedly be able to bring fresh ideas for solving local problems, as well as the advantage of outsourcing and outstaffing, in that the time for the implementation of specific projects is significantly reduced with minimal risk of delay.

Without question, this is budget savings because outsourcing companies often allow you to pay less than in the case of direct hiring. Many firms in this market operate in different countries, so that you can choose from various options.

We cannot ignore the fact that COVID-19 and the war in Ukraine have affected the educational process in our country. Despite educational institutions' efforts, the quality of graduates in the number of professions has decreased significantly, which again directs the business view to the already established highly professional market of outstaffing companies. Businesses must refrain from allowing spending time on personnel preparation, which is unnecessary because we get access to the talent pool from other countries.

Regarding the positive features of outsourcing, several scientists highlight the negative ones, including the language of the unauthorised dissemination of confidential information about the company, and the outsourcing company gives guarantees about the impossibility of leakage of information about the customer, but the use of this solution is not fully provided; companies, because the outsourcing firm is a business entity, therefore, there can potentially be problems that will be reduced to liquidation, as a result of which there is a need to find another outsourcing company and transfer all cases to it.

CONCLUSIONS

Summing up the above, note that the outsourcing contract is the obligation of business entities, the content of which is the mutual rights and obligations to perform the outsourcing processes transferred by the customer certain functions to meet the economic needs of the owner. In modern minds of management in the practice of subenterprises of Ukraine, there are relatively new opportunities to work with personnel or solve financial problems in cases where their employees cannot do the work for various reasons. Technologies include outsourcing and outstaffing. This has yet to become widespread due to several non-negative problems, although their implementation has positive aspects. The main benefits are lower costs and access to new technologies and innovations. All help organisations improve their financial matrices. B and demolish organisations can access skills and techniques from a global talent pool without a significant investment. With this rank, outsourcing helps new and already established businesses attract more professional workers by transferring their business processes to service providers with safer and more advanced technologies. The use of atypical forms of employment undoubtedly has its advantages, but their implementation is somewhat slowed down since the law is not fully regulated. In general, you need to explore the specifics of outsourcing and outstaffing, as these are promising ways to solve enterprise personnel problems.

REFERENCES

1. Taran-Lala, O., & Pavlenko, V. (2022). Osoblyvosti konkurentnospromozhnosti pidpryiemstv ta yikh vzaiemodiia v suchasnykh umovakh hospodariuvannia [Peculiarities of competitiveness of enterprises and their interaction in modern economic conditions]. *Investytsiia: praktyka ta dosvid, 23*, 47–52. doi: 10.32702/2306-6814.2022.23.47 (in Ukrainian).

2. Chen, K.-S., Chang, T.-C., & Lin, Y.-T. (2019). Developing an Outsourcing Partner Selection Model for Process with Two-Sided Specification Using Capability Index and Manufacturing Time Performance Index. *International Journal of Reliability, Quality and Safety Engineering, 26*(03), 1950015. doi: 10.1142/s0218539319500153

3. Cai, W., Liu, C., Jia, S., Chan, F. T. S., Ma, M., & Ma, X. (2020). An emergy-based sustainability evaluation method for outsourcing machining resources. *Journal of Cleaner Production, 245*, 118849. doi: 10.1016/j.jclepro.2019.118849

4. Ciasullo, M. V., Fenza, G., Loia, V., Orciuoli, F., Troisi, O., & Herrera-Viedma, E. (2018). Business process outsourcing enhanced by fuzzy linguistic consensus model. *Applied Soft Computing, 64*, 436–444. doi: 10.1016/j.asoc.2017.12.020

5. Haluza, L., & Saldan, T. (2015). Autsorynh yak instrument pidvyshchennia konkurentospromozhnosti pidpryiemstva [Outsourcing as a tool for increasing the competitiveness of the enterprise]. *Naukovyi visnyk Mukachivskoho derzhavnoho universytetu, 2*(4)*,* 124–128 (in Ukrainian).

6. Žitkienė, R., & Blusytė, U. (2015). The management model for human-resource outsourcing among service companies. *Intellectual Economics, 9*(1), 80–89. doi: 10.1016/j.intele.2015.10.003

7. Brazilii, N., Krot, Yu., & Pasternak, A. (2020). Osoblyvosti nadannia posluh austafinhu v Ukraini ta yikh dokumentalne oformlennia [Peculiarities of providing outstaffing services in Ukraine and their documentation]. *Pryazovskyi ekonomichnyi visnyk*, *2*(19), 249–254. doi: 10.32840/2522-4263/2020-2-42 (in Ukrainian).

8. Kukhta, K., & Ponomarenko, V. (2017). Autstafinh, autsorsynh ta kraud-tekhnolohii u konteksti transformatsii biznes-protsesiv [Outstaffing, outsourcing and crowd technologies in the context of transformation of business processes]. *Ekonomika i suspilstvo*, *17*, 553–557 (in Ukrainian).

9. Shevchenko, L. (2012). Pozykova pratsia: sutnist, ryzyky, osoblyvosti rozvytku v Ukraini [Loan work: essence, risks, peculiarities of development in Ukraine]. *Visnyk Natsionalnoho universytetu Yurydychna akademiia Ukrainy imeni Yaroslava Mudroh*o, *1*(8), 122–129 (in Ukrainian).

10. Dombrovska, H., & Herashchenko, I. (2018). Autstafinh – instrument v upravlinni personalom [Outstaffing is a tool in personnel management]. *Visnyk Natsionalnoho tekhnichnoho universytetu "KhPI" (ekonomichni nauky),* 37(1313), 77–81 (in Ukrainian).

11. Oliukha, V. (2015). *Optymizatsiia kapitalnoho budivnytstva: hospodarsko-pravovi problemy* [Optimization of capital construction: economic and legal problems]. Kyiv: Tsentr uchbovoi literatury (in Ukrainian).

12. The American Heritage dictionary of the English Language. (2023). *Main*. Retrieved December 01, 2022, from https://ahdictionary.com/word/search.html?q=outsourcin

13. Shvydka, V. (2018). Teoretychni ta praktychni pytannia pravovoho rehuliuvannia dohovoru autsorsynhu v Ukraini [Theoretical and practical issues of legal regulation of the outsourcing contract in Ukraine]. *Naukovyi visnyk Khersonskoho derzhavnoho universytetu. Seriia "Iurydychni nauky"*. 2, 1. 79–82 (in Ukrainian).

14. Zahriia, N. (2020). Autsorsynh ta autstafinh: yak tse pratsiuie? *Zakon & Biznes*, *27*. Retrieved from https://jurliga.ligazakon.net/news/198064_autsorsing--autstafng-ponyattya-ta-osoblivost (in Ukrainian).

15. Bravar, J.-L., & Morgan, P. (2007). *Effektivniy autsorsing* [Effective outsourcing]. Kyiv: Balance Business Books (in Ukrainian).

16. Prokhorenko, O., & Brin, P. (2018). *Upravlinnia autsorsynhom na promyslovomu pidpryiemstvi* [Outsourcing management at an industrial enterprise]. Kharkiv: Drukarnia Madryd (in Ukrainian).

17. Stakhurska, O. (2017). Autsorsynh v Ukraini y u sviti: osoblyvosti, tendentsii ta perspektyvy [Outsourcing in Ukraine and the world: features, trends and prospects]. *Yuryst & Zakon, 38*. Retrieved from http://uz.ligazakon.ua/ua/magazine _article/EA010850 (in Ukrainian).

18. Holton. L. (2020, July 10). *The 11 Types of Outsourcing Explained*. Retrieved from https://myva360.com/blog/the-11-types-of-outsourcing-explained

19. Melnykova, M., & Kosytskyi, K. (2018). Tekhnolohii autsorsynhu v upravlinni podatkovymy zoboviazanniamy promyslovoho kholdynhu [Outsourcing technologies in the management of tax obligations of an industrial holding]. *Efektyvna ekonomika, 8*. Retrieved from http://www.economy.nayka.com.ua/?op=1&z=6483 (in Ukrainian).

20. Sainchuk, A. (2019). Analiz rynku autsorynhvykh pidpryiemstv v Ukraini [Analysis of the market of outsourcing enterprises in Ukraine]. *Ekonomichnyi visnyk Donbasu, 2*(56), 135–144 (in Ukrainian).

21. Tsyvilnyi kodeks Ukrainy [The Civil Code of Ukraine] (Ukraine), 16.01.2003, No 435-IV. Retrieved February 01, 2023, from https://zakon.rada.gov.ua/laws/show/435-15#Text (in Ukrainian).

22. Kuzmenko, H. (2022). Vplyv nestandartnykh form zainiatosti na pravove rehuliuvannia trudovykh vidnosyn v Ukraini [The influence of non-standard forms of employment on the legal regulation of labor relations in Ukraine]. *Pravo i suspilstvo*, *5*,116–121. doi: 10.32842/2078-3736/2022.5.17 (in Ukrainian).

23. Vasylyk, A., & Tsarenko, O. (2015). Suchasnyi stan ta problemy vykorystannia tekhnolohii zapozychenoi pratsi v Ukraini [The current state and problems of the use of borrowed labor technologies in Ukraine]. *Molodyi vchenyi,* 2(17), 150–154 (in Ukrainian).

Полісемія власних назв у мові фольклору та проблема її відбиття у «Словнику мови усної народної словесності»

Polysemy of Proper Names in the Language of Folklore and the Problem of Its Reflection in the "Dictionary of the Language of Oral Folklore"

Руслан Сердега [1]
Ruslan Serdeha

[1] *H. S. Skovoroda Kharkiv National Pedagogical University*
2 Valentynivska Street, Kharkiv, 61168, Ukraine

DOI: 10.22178/pos.89-20

LCC Subject Category:
PE1001-1693

Received 10.12.2022
Accepted 20.01.2023
Published online 31.01.2023

Corresponding Author:
ruslan.serdega@ukr.net

© 2023 The Author. This article is licensed under a Creative Commons Attribution 4.0 License

Анотація. Лексико-семантична мовна система, як відомо, є динамічною. Вона постійно розвивається, зазнає змін. Одним із найголовніших засобів системної організації лексичного складу мови є полісемія. Багатозначність належить до універсальних мовних явищ. Вона забезпечує одну з найважливіших вимог до мови як сигніфікативної системи, що має за допомогою мінімальної кількості знаків передавати максимальну кількість інформації. Слова будь-якої мови перш за все виконують функцію номінативну, тобто називають різні предмети, об'єкти та явища довколишньої дійсності. Власні найменування, на противагу загальним, семантика яких об'єднує, узагальнює низку однотипних об'єктів, характеризуються тим, що, називаючи щось, вони мають індивідуалізувати об'єкт, вирізнити його серед подібних до себе. Здавалося би, якщо функція онімів полягає в індивідуалізації явищ об'єктивної дійсності, називанні й виокремленні тих або тих реалій чи певного класу імен, то б вони не мали бути багатозначними, однак власні назви також можуть бути полісемантичними, що зайвий раз свідчить на користь універсальності досліджуваного нами явища. Основна мета нашої розвідки полягатиме в поданні прикладів лексикографування полісемічних онімів, наявних у мові українського фольклору. У статті ми також прагнемо встановити основні типи власних найменувань, що зазнають розширення семантики.

Онімний простір фольклору становить досить розгалужену систему, яка, очевидно, ще потребуватиме подальших наукових досліджень і докладнішої лексикографічної репрезентації. Подальшу перспективу нашого дослідження вбачаємо в тому, що представлений нами в цій розвідці матеріал може увійти з часом до «Словника мови усної народної словесності» або вибіркового словника, присвяченого власним назвам, уживаним у мові фольклору.

Ключові слова: полісемія; власні назви; мова фольклору; Словник мови усної народної словесності; фольклор; семантика.

Abstract. The lexical-semantic language system is known to be dynamic. It is constantly evolving and changing. Polysemy is one of the primary means of systematic organization of the linguistic structure of a language. Polysemy is a universal linguistic phenomenon. It provides one of the essential requirements for a language as a signifying system that must convey the maximum amount of information with a minimum number of signs. The words of any language primarily perform a nominative function, i.e., they name various subjects, objects, and phenomena of the surrounding reality. Proper names, as opposed to standard terms, whose semantics unites and generalizes several similar objects, are characterized by the fact that when naming something, they have to individualize the thing to distinguish it from its kind. It would seem that if the

function of nouns is to individualize the phenomena of objective reality, to name and determine specific facts or a particular class of names, then they should not be polysemous, but proper names can also be polysemantic, which once again testifies to the universality of the phenomenon we are studying. The main goal of our research is to present examples of lexicographic polysemic onymes present in the language of Ukrainian folklore. The article also aims to identify the main types of proper names that undergo semantic expansion.

The onymic space of folklore constitutes a rather extensive system, which still requires further scientific research and lexicographic representation. The prospect of our study is that the material presented in this paper may eventually be included in the "Dictionary of the Language of Oral Folk Literature" or a selective dictionary devoted to proper names used in the language of folklore.

Keywords: polysemy; proper names; language of folklore; Dictionary of the Language of Oral Folklore; folklore; semantics.

ВСТУП

Полісемія належить до універсальних явищ мови, яке виявляє себе передусім на морфемному та лексико-семантичному рівнях. Найбільш динамічною, змінною системою мови, як відомо, є лексико-семантична. Саме в лексиці найвиразніше й реалізується аналізоване нами явище. Слова певної мови називають різні предмети, об'єкти та явища довколишньої дійсності. Власні назви суттєво відрізняються від загальних, семантика яких об'єднує, узагальнює низку однотипних об'єктів, характеризуються тим, що, називаючи щось, вони мають індивідуалізувати об'єкт, вирізнити його з класу подібних. Тому власні найменування зазвичай і пишуться в українській мові з великої літери і мають тільки однину або тільки множину. Здавалося би, якщо функція онімів полягає в індивідуалізації явищ об'єктивної дійсності, називанні й виокремленні тих або тих реалій чи певного класу імен, то б вони не мали бути багатозначними, однак власні назви теж можуть бути полісемантичними, що зайвий раз свідчить на користь універсальності досліджуваного нами явища.

Власні назви завжди привертали й привертатимуть увагу мовознавців та інших дослідників. Учених цікавила історія їх виникнення, семантика, зв'язок з історією суспільства та світоглядними уявленнями людей. Привертала увагу дослідників і проблема функціонування власних назв у текстах художньої літератури, бо такі найменування часто дають надзвичайно цінну інформацію для інтерпретації твору. Функційні та стилістичні можливості українського літературно-художнього антропонімікону XIX-XX були в колі зору Л. Белея [1]. О. Зілинська дослідила функції географічних найменувань у художніх творах української літератури XVII ст. [18]. Семантичний і функційний аспект власних назв, уживаних в українській поезії XX ст., досліджувала І. Хлистун [5]. Літературними антропонімами, наявними в художніх текстах Т. Г. Шевченка, цікавилася Т. Черторизька [4]. М. Торчинський присвятив цілу монографію описові диференційних особливостей власних назв, пов'язаних із їх побутуванням у різностильових текстах [16]. Загалом сьогодні існує цілка низка праць, в яких досліджується літературно-художня ономастика.

Власні назви, використовувані в текстах фольклору, меншою мірою потрапляли в коло зору науковців, хоча поступово інтерес до такого виду найменувань пробуджується. Серед дослідників, що цікавляться онімним простором фольклору, слід згадати Н. Колесник. Вона висловлює думку про необхідність визначення місця фольклоронімів у національній ономастичній системі, оскільки це є засадничим, базовим завданням, що дозволить, з одного боку, з'ясувати специфіку фольклорної онімії загалом, а з другого – визначити особливості функціонування різних власних найменувань у мові усної народної словесності [8, с. 252]. Згадувана дослідниця займалася також вивченням особових імен в обрядових піснях українського народу [7]. Крім того, вона є ще автором монографічного дослідження, присвяченого онімному простору народної пісні [6]. Чи не найбільш дослідженим сьогодні є ономастикон чарівної народної казки. О. Порпуліт дослідила оніми українських

народних чарівних казок, зіставивши їх із відповідними казками російського народу [13], М. Редьква – семантико-функціональну систему власних найменувань у казках того ж жанру на матеріалі записів XIX ст. [14]. М. Курушина цікавилася мовно-культурною специфікою онімів, уживаних в українських чарівних казках [10]. Антропонімний простір соціально-побутових казок українського народу був предметом дослідження автора цієї статті [15]. У колі зору дослідників також був ономастикон замовлянь [3].

Полісемія як явище мови цікавило багатьох дослідників. Л. А. Лисиченко зауважила, що вона є важливим чинником організації МКС (мовної картини світу) [12, с. 83]. Полісемантичність слова – це не просто сукупність номінативних елементів, це структура з чіткою визначеною організацією її складових. У багатозначному слові одне із значень сприймається нами як основне, що прямо пов'язане з основою концепту предмета, явища, дії і якості й відбиває його суспільне розуміння, тобто це слово є знаком відповідного явища [12, с. 88], а його основне значення становить опору і є «суспільно усвідомленим фундаментом усіх інших значень і вживань слова» [12, с. 88]. Власні назви, як і загальні, мають таке опорне, денотативне значення, на яке накладаються всі інші додаткові смислові відтінки. Наочно продемонструвала цей факт Г. Лукаш, створивши «Словник конотативних власних назв» [11]. Наприклад, топонім «Банкова» подається в цьому словнику, зрозуміло, спочатку в прямому значенні, що називає відповідну вулицю в Києві, на якій розміщується секретаріат Президента [11, с. 53], а потім подаються переносні значення, зокрема метонімічне «Президент України та його адміністрація» і значення «престижний мікрорайон», яке авторка трактує як узуальний інтралінгвальний конотативний топонім, уживаний у певному соціальному жаргоні [11, с. 53]. Однак цей словник не бере до уваги фольклорних джерел. Щодо інших розробок безпосередньо присвячених описові власних назв, уживаних у текстах фольклору, то в лексикографічній розвідці Н. Колесник узагалі практично відсутнє тлумачення як таке. Вона зауважує, що «пояснення потребуватимуть насамперед маловідомі назви, наприклад, міфоніми, мікротопоніми, зооніми, казкові найменування, для розуміння яких потрібне знання не лише про їх належність до певного онімного класу, а й мовні та екстралінгвальні асоціації, пов'язані з їхніми референтами» [9, с. 9]. Т. Беценко підготувала невеликий за розміром «Словник-покажчик географічних найменувань», у якому подає топонімний матеріал, вилучений із текстів народних дум [2, с. 108–111], проте такий тип лексикографічних праць узагалі не передбачає тлумачення. Однак до деяких топонімів вона подає короткі коментарі, наприклад, Дністр, річка [2, с. 109], які вказують на те, який саме географічний об'єкт позначається тією чи іншою назвою. Крім річки, це може бути країна, місто, острів, півострів та ін. Використовує Т. Беценко й більш розгорнуті коментарі, що окреслюють геопростір, включених у покажчик топонімів, і вказують на їхнє нинішнє або колишнє місцезнаходження: Базавлуг, *річка на Дніпропетровщині, права притока Дніпра*; Білограбська земля – *турецька земля* [2, с. 109], Кримка, *річка в Донецькій області*; Кумейки, *село Черкаського району Черкаської області*; Крилов, *нині місто Ново-Георгієвськ, районний центр Кіровоградської області* [2, с. 110], Прут, *ліва притока Дунаю*; Трапезунд, Трапезон, *нині місто і порт у Туреччині;* Тягиня, Тягин, *фортеця у м. Бендери на Дністрі* [2, с. 111]. Однак проблема полісемії пропріальної лексики, наявної у текстах фольклору, сьогодні є практично не дослідженою. Відсутнє в українській лінгвістичній науці й належне лексикографічне опрацювання онімів фольклору.

Мета дослідження – подання прикладів лексикографування полісемічних пропріативних одиниць, наявних у мові усної творчості українського народу. До завдань уходитиме встановлення основних типів онімів, що зазнають розширення семантики, а також подання зразків лексикографічної параметризації відповідних назв.

РЕЗУЛЬТАТИ ДОСЛІДЖЕННЯ

Помітну здатність до розширювання семантики мають антропоніми, зокрема власні імена людей. Особове ім'я Микола (частіше в текстах фольклору використовується такий варіант цього імені, як Миколай) якраз є опорним, основним, власне номінативним. На його базі виникають інші семантичні відтінки, що об'єднуються загальним значенням «ім'я» (ім'я святого, назва його зображення (ікона), свято, що вшановує канонізовану

особу, найменування релігійної установи, названої на честь відповідного святого. Зауважимо, що якщо повне ім'я особи має кілька варіантів, то їх подаємо курсивом після основного найпоширенішого в текстах фольклору. Далі ще подаємо зменшено-пестливі варіанти імені, які вдалося зафіксувати у творах народної словесності. У круглих дужках обов'язково зазначаємо джерело, з якого було вилучено відповідне ім'я, подаємо ілюстрацію з ним та вказуємо сторінку, з якої було взято відповідний контекст. Якщо поспіль подаються контексти з того самого джерела, то, з метою економії місця у словнику, пропонуємо застосовувати позначку «Так само». Якщо ілюстрація до відповідного оніма є надто розгорнутою, то відсилаємо до неї за допомогою звичайного посилання, не наводячи її при цьому в тексті статті. Подамо далі приклад можливого лексикографування оніма Миколай.

МИКОЛА́Й, -я. *Мико́ла*, -и. 1. *гр*., особове ім'я *Nikolaos*; від *nikē* – перемога і laos – народ (переможець народів). *Надулася на малай, що її не взяв Миколай* (Укр. прислів'я та приказки / упоряд. С. В. Мишанича та М. М. Пазяка. К. : Дніпро, 1984. С. 168); *Зустрілися двоє хлопчиків – Петро й Микола* (Придніпровські сміховини: укр. народні анекдоти, жарти, дотепи / упоряд. П. Ф. Гальченка. Дніпропетровськ: Промінь, 1971. С. 86). Зменш.-пестл. варіанти: *Ко́ля*, -і., *Колю́нчик,* -а. *Коля-Колюнчик / Розбив чавунчик, / Черепочки збира, / Ними курочку ганя* (Дитячий фольклор / упоряд. Г. В. Довженок. К. : Дніпро, 1986. С. 169); *Мико́лка*, -и. *Аж тоді подумала: «Миколка – старший мій, – у хаті!»* (Народні оповідання / упоряд. С. В. Мишанича. К. : Дніпро, 1986. С. 297). 2. Святий Миколай (Микола), Миколай Чудотворець, Миколай Мирлікійський або Мирський; канонізований християнський священник грецького походження, що жив і діяв за часів Римської імперії, був єпископом у Мирі Лікійській, один із найбільш шанованих святих у християнській релігії. свято́й Микола́й *«Желає за тебе сирота безщасна, безрідна, / дівчина молодая, – / Велю я собі, сину, її брати – Будеш ти з нею щастя і долю мати. Де муж з жоною живе-проживає, / Там святий Миколай на радість уходжає»* (Думи / упоряд. Г. А. Нудьги. К. : Рад. письменник, 1969. С. 256); свято́й Мико́ла [17, с. 271]; (свято́й) *Миколи́й Уго́дник* [17, с. 304]; (свято́тель) *Мико́ла* [17, с. 276]; (свято́тель) *Хри́стів Миколи́й* [Там само]. 3. Ікона, образ Святого Миколая, Миколая Чудотворця або Угодника, зображення канонізованого християнського священника – єпископа Мирського. Миколи́й *Дивиться: сметана спита, а святий Миколай у сметані. Розсердилася – і трісь горнцем Миколая. Горнець розсипався, айбо й дошка, на якій був намальований святий, розкололася* (Чарівна торба: українські народні казки, притчі, легенди, перекази, пісні та прислів'я, записані від М. І. Шопляка-Козака / упоряд І. М. Сенька. Ужгород: Карпати, 1988. С. 72); Мико́ла [17, с. 272]; *Миколи́й-уго́дник*. *Понамазував* [Іван] *усім* [святим, іконам] *по дному разу* [губи сметаною], а Миколаєві-угоднику, так як він старший за всіх, вимазав і бороду (Соціально-побутова казка / упоряд. О. Ю. Бріциної. К. : Дніпро, 1987. С. 224). 4. Релігійне свято на честь святого Миколая (*Приходить свято Миколая, у церкві має бути храм*, *а образ Миколая розколотий* (Чарівна торба: українські народні казки, притчі, легенди, перекази, пісні та прислів'я, записані від М. І. Шопляка-Козака / упоряд. І. М. Сенька. Ужгород: Карпати, 1988. С. 72). 5. Церква, релігійна установа, названа на честь святого Миколая. *це́рква свято́го Мико́ли* [17, с. 276].

Кількість лексико-семантичних варіантів у наведеній моделі опису особового імені, вживаного у фольклорі може варіюватися в межах 2-5. Здебільшого подібні найменування тяжіють до чотиричленної семантичної структури – особове ім'я (антропонім), зображення святого чи ангела) (іконім), назва релігійного свята (геортонім). Наприклад, особове ім'я Георгій (Юрій), крім прямого, номінативного значення може виступати в текстах фольклору в переносних значеннях – називати святого з таким іменем, називати ікону (зображення) Георгія Змієборця (Переможця) і позначати День Святого Георгія, що відзначається двічі на рік – навесні 6 травня (Юрій голодний, бо всі припаси худоби завершуються) і взимку 9 грудня (холодний, бо починаються холоди).

Спостерігаємо в мові фольклору інколи власні назви, що постали на основі загальних. До таких зокрема належить теонім Пречиста, що походить від прикметника пречистий, тобто непорочний, святий, але внаслідок субстантивації перейшов до розряду іменників. У словниковій статті, що буде базовим елементом словника фольклоронімів, тобто спеціальної лексикографічної праці, присвяченої

описові власних назв, наявних у мові фольклору, очевидно, не має демонструвати зв'язок цього оніма із загальною назвою пречистий (нічим не опоганений; той, що має чисті помисли, непорочний, святий). Однак у лексикографічній праці, що загалом буде присвячена мові фольклору, очевидно, про нього треба згадати навіть якщо воно не буде зафіксоване безпосередньо в текстах фольклору з відповідним значенням чи значеннями: ПРЕЧИ́СТИЙ, -а, -е. Святий, непорочний, з чистими помислами. // *Пречи́ста*, -ої. Субстантивований епітет, що використовується для називання матері Сина Божого (Ісуса Христа); Богородиця [17, с. 66].

Під цією назвою також об'єднують три церковних свята, пов'язаних з ушануванням Діви Марії (Богородиці). Це Перша Пречиста, або ж Успіння Пресвятої Богородиці, день завершення земного життя Діви Марії, що святкується 28 серпня. Друга Пречиста, або Різдво Богородиці, чи Мала Пречиста, – це народження матері Ісуса, Сина Божого, що святкується 21 вересня. Третя Пречиста, або Ведення у храм Пресвятої Богородиці, відзначається 4 грудня, у цей день батьки віддали Марію на службу Божу до Єрусалимського храму. *Явилась Пречиста – почалася осінь чиста* (Васютіна Т. М., Золотар О. М. Етнокологічний календар природи: посібник для вчит. та учня / за ред. І. В. Мороза. Тернопіль: Навчальна книга-Богдан, 2007. С. 96); *Якщо після Малої Пречистої тварини прагнуть на пасовище рано, то й зима буде рання* (Там само, С. 97).

Зв'язок із загальною назвою має також агіонім Свята П'ятниця, що може в текстах фольклору виступати і в якості клерикал-геортоніма, тобто позначати релігійне свято. Лексикографування цієї назви може здійснюватися практично за трохи відмінною моделлю, ніж для попереднього слова, бо коли слово «п'ятниця» починає виступати агіонімом, то воно здебільшого поєднується з означенням Свята. Наведемо далі зразок можливої словникової статті з цією назвою.

П'Я́ТНИЦЯ, -і. 1. Назва п'ятого дня тижня. *Ой в середу ізвечора / Турків обступали, / А в п'ятницю до полудня / Всіх упень рубали* (Історичні пісні / упоряд. І. П. Березовського. К. : Рад. письменник, 1970. С. 80). 2. *Свята́ П'я́тниця*. Християнська свята Параскева Іонійська; міфологічний образ, який поєднує в собі християнські риси із східнослов'янським язичницьким культом родючості. // Антропоморфізований жіночий день [17, с. 246-247]. 3. *П'я́тниця*, -і. Свято на честь ушанування великомучениці Параскеви-П'ятниці [17, с. 246].

Досить розгалужену семанику має особове найменування Іван. Цей онім має й достатньо велику кількість варіантів, переважно зменшено-пестливих. Може це ім'я набувати й збільшено-згрубілої форми. Подамо далі можливий зразок лексикографування його значень.

ІВА́Н, -а. *Йван.* 1. *д.-євр.* ім'я *Yōchānān* – Ягве, милостивий; благодать Божа*;* дар богів. *Болить мені головонька / Ізрана. / Бо я вчора не виділа / Івана* (Пісні кохання / упоряд. О. І. Дея. К. : Дніпро, 1986. С. 56); *«Було б, Надю, не журитись, / Не вестись погано, / Ти ж казала подружечкам: / Не піду за Йвана* (Там само, С. 263). Зменш.-пестл. варіанти*: Ваню́ша,* -і. *А за нею, а за нею, / А за нею Ванюша: «Не плач, серце Маруся, / Я з тобою, я з тобою, / Я з тобою люблюся, / Поки не зна матуся* (Там само, С. 81); *Ва́нька,* -и. *І Ванькові уже п'ятнадцять сповнилось, під ним Гришкові чотирнадцятий пішов* (Народні оповідання / упоряд. С. В. Мишанича. К. : Дніпро, 1986. С. 216); *Ва́ня*, -і. *Купи мені, Ваня, зелену запаску, / Щоб я не забула, який ти на ласку; Купи мені, Ваня, червоне намисто, / Щоб я не забула, який ти намітний* (Пісні кохання / упоряд. О. І. Дея. К. : Дніпро, 1986. С. 242); *Іва́нейко,* -а. *Там по сніжкові, по порушкові, / Там походило три лебедойці. / То їх послідив пан Іванейко* (Колядки та щедрівки / упоряд. О. І. Дея. К. : Наук. думка, 1965. С. 171); *Іва́ненько,* -а. *Ой пішов Іваненько у поле орати, / Катеринка молоденька – до корчми гуляти* (Балади / упоряд. О. І. Дей та ін. К. : Наук. думка, 1988. С. 134); *Іва́нечко,* -а. *Іван, Іван, Іванечко, / Цілуй мене щоранечко, / Цілуй мене щовечора, / Поший шубу овечую* (Бандурка / упоряд. М. Сулима. К. : Дніпро, 2001. С. 126); *Іва́нко,* -а. *Вийди, вийди, Іванку, / Заспівай нам веснянку!* (Перлини української народної пісні / упоряд. М. М. Гордійчук. К. : Муз. Україна, 1991. С. 12); *Йва́нко,* -а. *Кажуть люди, Йванку, / Що я буду бита* (Пісні кохання / упоряд. і передм. О. І. Дея. К. : Дніпро, 1986. С. 56); *Чикилю, чикилю та біля дороги, / Що в мого Йванка да кривії ноги* (Жартівливі пісні / упоряд. О. І.Дей та ін. К. : Наук. думка, 1967. С. 75); *Іваної́йко,* -а. – *А ти, сонейко, яснейко світиш: / Ци-сь не видало мого синойка, / Мого синойка, ей, Іваной-*

ка? (Балади / упоряд. О. І. Дей та ін. К. : Наук. думка, 1988. С. 336); *Іва́нок,* -нка. – *Ой чий то синок, синок Іванок / Поперед війська конем грає, / А позад війська мечем рубає, / Хвалиться конем перед перед королем, / Перед панною – гострою шаблею* (Колядки та щедрівки / упоряд. О. І. Дея. К. : Наук. думка, 1965. С. 195); *Йва́нок,* -а. *На другий день поступає, / Марієчка промовляє: «Ой Іване, Іваночку, / Чи видиш ти дорожечку?»* (Українські народні пісні / упоряд. О. М. Хмілевської. К. : Муз. Україна, 1967. С. 48); *Іва́нонько,* -а. *А в тій світлоньці тисові столи, / За тими столами сидять панове, / Межи тими панами гойний панич, / Гойний панич чом Іванонько* (Колядки та щедрівки: зимова обрядова поезія трудового року / упоряд. О. І. Дея. К. : Наук. думка, 1965. С. 144); *Іва́ночко,* -а. *«Ой Іване, Іваночку, / Звівєсь мене з розумочку»* (Балади: родинно-побутові стосунки / упоряд. О. І. Дей та ін. К. : Наук. думка, 1988. С. 289); *Івано́чок*, -чка*. Ой пішов Іваночок на тяженьку войну, / Лишив, лишив а Марічку у дому здоровну* (Балади: родинно-побутові стосунки / упоряд. О. І. Дей та ін. К. : Наук. думка, 1988. С. 254); *Іваню́ньо,* -я. *Любила-м ті, Івануню, як з горіха зерня, / Тепер є-с мі на серденьку, як колюче терня* (Бандурка: українські сороміцькі пісні / упоряд. М. Сулима, К. : Дніпро, 2001. С. 171)*; Іва́нцьо,* -я.; *Йва́нцьо,* -я. *Любив мене, мамцю, Йванцьо, я го не любила…* (Коломийки / упоряд. Г. М. Литвака. К. : Рад. письменник, 1963. С. 90); *Іва́нчик,* -а. *Обом йменнячко дала – Іванчика й Василя* (Балади: родинно-побутові стосунки / О. І. Дей та ін. К. : Наук. думка, 1988. С. 35); *Іва́нько,* -а. *У полі, полі, близько при дорозі / Грай, коню, грай, кониченьку, / Перед молоденьким Іваньком* (Колядки та щедрівки / упоряд. О. І. Дея. К. : Наук. думка, 1965. С. 186); *Іва́ньо,* -я. *Почекай-но, Іваню, / Нехай вугля розпалю* (*А це в поле, / А це море, / А це наввишки, / Скакай, Івашку, з колиски* (Дитячий фольклор / упоряд. Г. В. Довженок. К. : Дніпро, 1986. С. 117); *Іванюо́точка,* -и. *Ой за горами, ой за водами – Там п'є, гуляє Іванюточка з козаками* (Чумацькі пісні / упоряд. О. І. Дей та ін. К. : Наук. думка, 1976. С. 400); *Іванюо́ша,* -і. *Два синочки родила: Іванюшу й Василя* (Дитячий фольклор / упоряд. Г. В. Довженок. К. : Дніпро, 1986. С. 26); *Івасе́йко,* -а. *Ой пошов же Івасейко до нової скрині: / Ні сукна ми, ні пенязів,ані господині* (Там само, С. 133); *Іва́сенько,* -а. *Ой поїхав, Івасенько, на на польовання, / Гей, моцний боже, на польовання* (Там само, С. 47); *Іва́сечко,* -а. *Та й поїхав Івасечко сім літ на війну, / Гей, гей, сім літ на війну* (Там само, С. 247); *Іва́сик,* -а. – *Ой не встану, Івасику, бо не маю сили!* (Там само, С. 251); *Івасу́нь,* -я. *Ей, Івасю, Івасуню, дай коникам сіна, / Та й положи головоньку на мої коліна* (Бандурка: українські сороміцькі пісні / упоряд. М. Сулима, К. : Дніпро, 2001. С. 179); *Іва́сь,* -я. *Чого Івась не навчиться, того й Іван не буде знати* (Народ скаже – як зав'яж: укр. народні прислів'я, приказки, загадки, скоромовки / упоряд. Н. Шумади. К. : Веселка, 1985. С. 26); *Іва́сьо,* -я. *Пішов же Івасьо в чужую сторону, / Жаль же єго, боже!* (Календарно-обрядові пісні / упоряд. О. Ю. Чебанюк. К. : Дніпро, 1987. С. 180); *Івасю́нейко,* -а. *Там Івасюнейко личейко вмивав, / Личейко вмивав, коня напував* (Колядки та щедрівки / упоряд. О. І. Дея. К. : Наук. думка, 1965. С. 145); *Івасю́ньо,* -я. *Пас Івасюньо коня вороного* (Календарно-обрядові пісні / упоряд., О. Ю. Чебанюк. К. : Дніпро, 1987. С. 300); Іва́сь (Йвась), -я. *Гей, як Івась того випив, / Сів ся конец стола, / Мати єго питає сі: «Де-с був, Йвасю, вчора?»* (Там само, С. 190); *Іва́шечко,* -а. *Ой сину мій Івашечку, подай білу руку!* (Там само, С. 350), *Іва́шко,* -а. *А це в поле, / А це море, / А це наввишки, / Скакай, Івашку, з колиски* (Дитячий фольклор / упоряд. Г. В. Довженок. К. : Дніпро, 1986. С. 101). Збільшено-згрубіла форма: *Йва́нище,* -а. *Та й каже* [один чоловік]: – А ти, бідний, Йванище, їж тулубище (Гайсенюк В. Моя бабуся приповідала… Фольклор села Летяче: збірник / укл. В. Гайсенюк. Біла Церква: Видавець Пшонківський О. В. 2019. С. 162); 2. Івана Купала, або ж Іванова ніч, давнє дохристиянське свято на честь літнього сонцестояння, бога літнього сонця Купали, що відзначається 7 липня за старим стилем, 24 червня – за новим, прив'язане пізніше православною церквою до імені Івана Хрестителя (Предтечі), що хрестив у водах Йордану самого Ісуса Христа. *Якщо на Івана проса з ложку, то й у ложці буде* (Васютіна Т. М., Золотар О. М. Етноекологічний календар природи / за ред. І. В. Мороза. Тернопіль: Навчальна книга-Богдан, 2007. С. 67). 3. *перен.* Дурна, недалека людина. *Мудрий Іван по шкоді: коні вкрали, тоді він стайню зачинив* (Українські народні прислів'я та приказки / упоряд. В. Бобкова, Й. Багмут, А. Багмут. К. : Держвидав худ. літ-ри, 1963. С. 393). 4. *перен.* Простий чоловік, людина з народу. *Іван не пан, а сто злотих не гроші* (Там само, С. 121).

Розширення семантики ми можемо спостерігати і в таких власних назвах, як топоніми. Полісемія розвивається переважно в географічних найменуваннях, що позначають назви країн (хоронімах), населених пунктів (ойконімах), річок (гідронімах). Наприклад, хороні́м Україна може зазнавати метонімізації і позначати не країну, а народ, який у ній проживає. УКРАЇ́НА, -и. Вкраї́на, -и. 1. Країна, держава, розташована в Східній Європі. *Гей, сорок тисяч війська ще й чотири, / Гей, виїздили козаченьки з України* (Балади / упоряд. О. І. Дей та ін. К. : Наук. думка, 1988. С. 295); *Як ти будеш мене, мати, бити, / То я піду на Вкраїну жити* (Пісні кохання / упоряд. О. І. Дея. К. : Дніпро, 1986. С. 119). 2. *перен.* Народ, що проживає в цій країні; українці. *Ой то ж не дівчина за вбитим козаченьком / побивалася, / А то Україна вся сльозами умивалася* (Думи / упоряд. Г. А. Нудьги. К. : Рад. письменник, 1969. С. 286). Подібну метонімізацію ми можемо спостерігати і в ойконімах, де назва населеного пункту можемо замінювати собою його мешканців.

До багатозначності можуть тяжіти й деякі гідроніми, зокрема такі, як Дніпро, Дунай. Гідронім Дніпро, як зазначає Т. Беценко, може, крім власне інформативного навантаження, виконувати ще символічну функцію, тобто називати Україну загалом, виступати у фольклорному тексті символом рідної країни [Беценко, с. 108]. Таким чином, вищезгадана власна назва має загальноінформаційне значення, але у певних контекстах вона набуває символічного значення. Подамо далі приклад можливого лексикографування.

ДНІПРО́, -а. *Дніпр*, -а, *Славу́та,* -и, *Дніпро́-Славу́та*, Дніпра-Славути. 1. Річка в Україні з найдовшою течією, третя за розміром у Європі, на якій розташовано столицю України – Київ та багато інших українських міст (Канів, Кременчук, Дніпро, Запоріжжя, Херсон, Черкаси). Інші назва: *Славутич.* Славута, Славутич – давня українська і козацька назва цієї річки. *Сів я на скелі біля Дніпра і почав снідать* (Народні оповідання / упоряд. С. В. Мишанича. К. : Дніпро, 1986. С. 23)*; А другий брат Дніпром іде, / Дев'ятеро коней за собой веде* (Там само, С. 130); *Як стане по Дніпру хмара походжати, / Старий Дніпр дощем полоскати – / Тоді мене, моя мила, ждати, піджидати!* (Думи / упоряд. Г. А. Нудьги. К. : Рад. письменник, 1969. С. 249); *Тоді козаки собі добре дбали, / Сім штук гармат собі арештували, / Ясу воздавали, / На Лиман-ріку іспадали, / К Дніпру-Славуті низенько уклоняли*…(Там само, С. 87); *Промовить тихий Дунай до Дніпра-Славути: «Дніпр-батьку, Славуто!..* (Героїчний епос українського народу / упоряд. О. М. Таланчук, Ф. С. Кислого. К. : Либідь, 1993. С. 60) // *Дніпро́-луг*, *Дніпра-лугу.* Величезні річкові плавні, понад 400 км, які за часів існування Запорозької Січі розташовувалися колись на лівому березі Дніпра між самим Дніпром і річкою Конка. *Біжи ж ти* [джуро Яремо] *скоренько та поспішненько / понад Дніпром-лугом, / Як будуть ушкали густи, то ти схоронися, / А як будуть козаки Дніпром-Славутою іти, то ти озовися / І про мене, Хведора бездільного / та безрідного, козакам обозвися* (Думи / упоряд. Г. А. Нудьги. К. : Рад. письменник, 1969. С. 184). 2. *перен.*, *симв.* рідний край, Україна. *Тоді взяв він, Шевченко, гроші і наняв фуру та й поїхав у село, і купив собі фуру чужої землі. Сів на ту землю зверху і їде собі в рідний край, до Дніпра* (Євшан-зілля: легенди та перекази Поділля / упоряд. П. Медведика. Львів: Червона калина, 1992. С. 106).

Гідронім *Дунай*, як і *Дніпро*, може позначати конкретну річку і може набувати узагальнювальної семантики і називати тоді велике скупчення води загалом. Наведемо далі приклад можливої словникової статті з цим онімом.

ДУНА́Й, -ю. *Дунай-річка*, Дунай-річки. 1. Друга за довжиною річка Європи, що протікає країнами Східної та Центральної Європи і впадає в Чорне море. *Росла у мене за хижею яблуня. Вода підмила берег і віднесла яблуню до Дунаю* (Народні оповідання / упоряд. С. В. Мишанича. К. : Дніпро, 1986. С. 318); *Ой Дунай-річка да не широка, / Да на перевози усе глибока, / Да луги з лугами, / А береги з берегами* (Українські народні пісні / упоряд. О. М. Хмілевської. К. : Муз. Україна, 1967. С. 243). 2. *перен. Дунай-вода*, *Дунай-море.* Розлив води, велике її скупченння, вода загалом. *Ой вийду я за ворота / Дунай розіллється, / На Дунаю-Дунаєчку / Два лебеді плавле – / Один білий, один білий, / А другий біліший, / Один вірний, один вірний, / А другий вірніший* (Пісні кохання / упоряд. О. І. Дея. К. : Дніпро, 1986. С. 59); *Ой дбай, мати, дбай / Та мене заміж оддай, / Та не дай мене та за п'яниченьку, / Бо мені вроди жаль, / Бо моя врода – як Дунай-вода, / Бо моє личко – так як яблучко, – Сама й молода* (Пісні кохання / упоряд. О. І. Дея. К. : Дніпро, 1986. С. 306);

Прийшли за Маріков троє сватачів. / А в Дунай море, Маріко-зоре, / Ійди д'нам (Колядки та щедрівки / упоряд. О. І. Дея. К. : Наук. думка, 1965. С. 444).

Зауважимо, що наведені словникові статті не претендують на вичерпний опис семантики, це лише робочі моделі, що можуть згодом стати основою для «Словника усної народної словесності».

ВИСНОВКИ

Онімний простір фольклору становить досить розгалужену систему, яка, очевидно, ще потребуватиме подальших наукових досліджень і подальшої лексикографічної репрезентації. Проведений у цій роботі аналіз власних назв не претендує на цілковиту вичерпність, бо ми відбиваємо, очевидно, лише незначну частку того онімного матеріалу, що наявний у текстах фольклору, проте здійснене нами дослідження дозволяє зробити певні висновки щодо репрезентативності різних видів власних назв. Найбільш потужно представлені у мові фольклору антропоніми й топоніми, серед них кількісно переважають назви населених пунктів (ойконіми). Досліджуючи вищезазначені власні найменування, основне своє завдання ми вбачали в представленні моделей лексикографічного опису цих назв. Загалом ми можемо стверджувати, що полісемія властива власним назвам так само, як і загальним, що свідчить зайвий раз про універсальність мовної системи загалом і полісемії як одного із регулярних її явищ зокрема. Один і той же онім може співвідноситися в текстах фольклору з різними типами власних назв. Найбільше тяжіють до багатозначності особові імена та географічні найменування. Загалом топоніми здебільшого вживаються у мові усної народної словесності в прямому значенні, тлумачення якого потребує окреслення географічного положення описуваного об'єкта, проте такі назви, як і власні імена людей, можуть набувати додаткових значеннєвих відтінків, що надають експресивного чи оцінного забарвлення відповідним онімам. Особові імена людей у фольклорних текстах часто можуть утворювати таку послідовність: особове ім'я людини – агіонім (ім'я святого) – іконім (зображення святого, ікона) – геортонім (назва свята на пошану праведника) – еклезіонімний андомонім (церква, названа іменем певного святого). Крім того деякі з них, прикметним у цьому плані є ім'я Іван, можуть набувати оцінних значень, що можуть характеризувати людину за різними ознаками (здібностями, вдачею, соціальною приналежністю та ін.). Топоніми здатні розширювати семантику за рахунок перенесення найменування з одного предмета на інший на основі їх суміжності. Це переважно суміжність просторова, коли назва місцевості заступає собою людей, що в ній проживають. Крім того, географічні найменування можуть набувати символічного значення (позначати рідний край, виступати символом гетьманської влади, козацької слави і т. п.). Гідроніми, зокрема Дунай, позначають не тільки конкретну річку, а й здатні набувати узагальнювального значення, позначати водний простір загалом. Подальшу перспективу нашого дослідження вбачаємо в тому, що представлений нами матеріал може увійти з часом до «Словника мови усної народної словесності» або вибіркового словника, присвяченого власним назвам, уживаним у мові фольклору.

СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ / REFERENCES

1. Belei, L. (1995). *Funktsionalno-styistychi mozhluvosti ukrainskoi literaturno-khudoznoi antroponimii XIX-XX st.* [Functional and stylistic possibilities of Ukrainian literary and artistic anthroponymy of the XIX-XX centuries]. Uzhhorod: n. d. (in Ukrainian).

2. Betsenko, T. (2017). *Estetyka movy ukrainskykh narodnych dum: tekstovo-obrazni odynytsi* [Aesthetics of the language of Ukrainian national dumas: textual and figurative units]. Sumy: Mriia-1 (in Ukrainian).

3. Butko, S. (2016). *Onomastykon ukrainskykh zamovlian: pokhodzhennia, sklad, funktsii* [Onomasticon of Ukrainian orders: origin, composition, functions] (Doctoral thesis; KNU im. V. N. Karazina). Kharkiv (in Ukrainian).

4. Chertoryzka, T. N. (1989). *Literaturni antroponimy v tvorakh T. H. Shevchenka* [Literary anthroponyms in the works of Taras Shevchenko]. *Movoznavstvo, 2*, 30–35 (in Ukrainian).

5. Khlystun, I. V. (2006). *Vlasna nazva v ukrainskii poezii II pol. KhKh st. (semantyko-funktsionalnyi aspekt)* [Proper names in Ukrainian poetry of the second half of the twentieth century (semantic and functional aspect)] (Doctoral thesis; NPU imeni M.P.Drahomanova). Kyiv (in Ukrainian).

6. Kolesnyk, N. (2017). *Onimiia ukrainskoi narodnoi pisni* [Onymia of the Ukrainian folk song]. Chernivtsi: Tekhnodruk (in Ukrainian).

7. Kolesnyk, N. (1998). *Osobovi imena v ukrainskykh narodnykh obriadovykh pisniakh* [Personal names in Ukrainian folk ritual songs] (Doctoral thesis; DPU imeni Volodymyra Hnatiuka). Ternopil (in Ukrainian).

8. Kolesnyk, N. (2021). Pryntsypy funktsionuvannia folkloronimiv [Principles of functioning of folkloronyms]. *Naukovyi visnyk Uzhhorodskoho universytetu. Seriia: Filolohiia, 1*(45), 250–255 (in Ukrainian).

9. Kolesnyk, N. (2014). Struktura statti v slovnyku folkloronimiv (na materiali burlatskykh ta naimytskykh pisen) [Structure of an article in the dictionary of folkloronyms (based on burlak and hired hand songs)]. *Naukovyi visnyk SIENU im. Lesi Ukrainky. Filolohichni nauky. Movoznavstvo, 2*, 7–14 (in Ukrainian).

10. Kurushyna, M. A. (2012). Movno-kulturna spetsyfika onimiv ukrainskykh charivnykh kazok [The linguistic and cultural specificity of the omics of Ukrainian fairy tales]. *Studia linguistica*, *6(2),* 61–67 (in Ukrainian).

11. Lukash, H. (2017). *Slovnyk konotatyvnykh vlasnykh nazv* [Dictionary of connotative proper names]. Vinnytsia: DonNU imeni Vasylia Stusa (in Ukrainian).

12. Lysychenko, L. A. (2009). *Leksyko-semantychnyi vymir movnoi kartyny svitu* [Lexical and semantic dimension of the linguistic worldview]. Kharkiv: Osnova (in Ukrainian).

13. Porpulit, O. (2000). *Onomastychnyi prostir ukrainskykh charivnykh kazok (u zistavlenni z rosiiskymy kazkamy)* [The onomastic space of Ukrainian fairy tales (in comparison with Russian fairy tales)] (Doctoral thesis; ODU im. I. I. Mechnykova). Odesa (in Ukrainian).

14. Redkva, M. (2008). *Semantyko-funktsionalna systema osobovykh naimenuvan v ukrainskykh narodnykh charivnykh kazkakh (u zapysakh XIX st.)* [Semantic and Functional System of Personal Names in the Ukrainian Folk Magic Tales (written down in the XIX-th century)] (Doctoral thesis; PNU im. V. Stefanyka). Ivano-Frankivsk (in Ukrainian).

15. Serdeha, R. (2022). Anthroponymic Space of the Ukrainian Folk Social and Household Tale. *Knowledge, Education, Law, Management, 3*, 99–105. doi: 10.51647/kelm.2022.3.17

16. Torchynskyi, M. (2009). *Struktura onimnoho prostoru ukrainskoi movy* [The Structure of the Onimous Space of the Ukrainian Language] (Vol. II). Khmelnytskyi: KHNU (in Ukrainian).

17. Vynnychuk, Yu. (Ed.). (2005). *Bibliini kazky* [Biblical talles]. Kharkiv: Folio (in Ukrainian).

18. Zilynska, O. (2017). Funktsii toponimiv u khudozhnikh tekstakh ukrainskoi pysemnosti XVII ct. [The Functions of Place Names in the Literary Texts of the Seventeenth Century Ukrainian Writing]. *Filolohichnyi chasopys, 1,* 41–52 (in Ukrainian).

The Main Factors Leading To Code-Switching In Azerbaijan

Aysel Eldar Soltanova [1]

[1] *Baku Engineering University*
120 Hasan Aliyev Street, Khirdalan city, Absheron, AZ0101, Azerbaijan

DOI: 10.22178/pos.89-25

LCC Subject Category:
PE1001-1693

Received 26.12.2022
Accepted 28.01.2023
Published online 31.01.2023

Corresponding Author:

asoltanova@beu.edu.az

© 2023 The Author. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. In today's globalised world integration of languages is a frequently experienced issue. Nowadays, people speak both English and Russian by mixing them with the Azeri language often. In linguistics, this phenomenon of mixing two languages is analysed and termed in various forms, such as code-switching, interculturalism, code-mixing etc. The study integrates quantitative research to assess interlocutors' and respondents; attitudes toward code-switching by using close-ended questionnaires. By revealing the key aspects affecting the emergence of code-switching from historical perspectives, the paper proves that preserving the originality and uniqueness of a language is a challenge that needs to be overcome. However, nowadays, at some point and by some respondents, this tendency has not been evaluated negatively.

By touching upon language contact situations based on intimate intersocietal relations and the outcome of this situation, the author used the quantitative method and data collection to conclude the goal set. Based on the background information of the respective community, the data and calculations are compiled systematically in tables and graphs for further analysis. The research outcome shows that education and other socio-economic relations are vital in protecting the existence and identities of languages. Moreover, the respondents' attitudes toward growing tendency helped to demonstrate the position and perspectives of people from different genders, backgrounds, and occupations.

Keywords: code-switching; integration; globalisation; mixing; interculturalism.

INTRODUCTION

Social relations and communicative practices in the context of late modernity create the opportunity to mesh languages and semiotic resources. However, it should be noted that these practices are familiar and recent. People from different occupations and backgrounds were observed through surveys to strengthen the position approaches to solving the problem in-depth. In this research, the units of observation were respondents and the language. As having been affected by communicative practices and social relations, "language" is an independent variable. Social practices, on the contrary, as an affecting part, are considered to be an independent variable.

The problem presented in the paper is the spread of switching two or more languages in verbal communication in the Azerbaijan community. Based on the observation of the process poses a real danger to the originality and authenticity of the Source Language. Even without realising it, people fill the language with words that belong to the other milieu. Moreover, in their interaction, they switch to a different language or languages by violating the norms of their mother language. This paper expounds on revealing the natural causes of the problem taken for granted by the population and offers ways of solving the problem within the community. By interviewing and conducting surveys among the people living in Azerbaijan and abroad, their attitudes and reactions toward this tendency, which by half stems from their inattentive and careless attitudes toward both languages, were observed. The result of the survey will be brought, thanks to which a conclusion on the causes and effects of the process can quickly be drawn upon. By applying exploratory and inductive research, the article is intended to prove that using more than one language in verbal interaction poses a threat from a linguistic perspective and has adverse effects on the country's cultural heritage.

The *article aims* to document and describe the forms of code-switching and code-mixing be-

tween Azerbaijani, Russian and English in contemporary Azerbaijan, show the ways that code-switching/mixing patterns vary among speakers, analyse the functions that these can and do serve within the survey among 156 people, and demonstrate ways in which code-switching and language mixing are used to construct social identities in that socio-cultural milieu.

METHODS AND MATERIALS

The research paper consists of two main parts. The first part delves into the root and reason for the emergence of this problem. Moreover, exploring the situation further leads to investigating its causes. However, in the second part of the investigation, an immediate solution to the problem, having been revealed and proven, will be presented. So, from one perspective, those who switch the codes don't need equal and advanced proficiency in both languages.

For a long time, linguists scarcely noticed CS, and they wrote about language contact. Authors [1, 2] referred to CS as the "transfer of words" the author [3] mentioned CS as the introduction of elements from one language into another, alteration of the second language, not just mixing. So, CS remained invisible over the last 40 years until [4] approached in early 1970. After that, people realised that code-switching is a widespread way of speaking. In social psychology, CS refers to language choices in a bilingual setting. So that according to [5], people perceiving their group as high (Anglo Canadians) think more positively while using their group language than those who perceive themselves to have their group as low vitality (Italy Canadians). CS as convergence at different levels was introduced by [6], and they mentioned that in practice, it is only sometimes possible to decide whether it occurred. Hence, according to [2], "one of the first terms used to describe L1 influence on L2 learning was interference, defined as "instances of language deviation from the norms of either language which occur in the speech of bilinguals as a result of their familiarity with more than one language".

RESULTS AND DISCUSSION

Azerbaijan is a developing country with many cultures and ethnic minorities living alongside locals and sharing their cultural heritages. To collect data by the experimental method, I will delve into some historical facts on the causes and effects of these historical implications on Code Switching and people. In 1828 Azerbaijan became part of the Russian Empire till the collapse of the Russian Empire in 1991. Governmental language policies and other socio/political forces influenced the Turkic population of the Republic of Azerbaijan to speak Russian. The growing tendency toward the Russian language is encapsulated in the works of Azerbaijan writers who wanted to show their attitude toward this process. During governmental policy and planning firmly support the development and use of Azerbaijani, Russian use persists in some sectors of society. With Russian political domination in the 19th century, many Russian and non-Muslim immigrants came to Azerbaijan. While some Russian peasants immigrated to the countryside, most administrative workers came to larger cities, particularly Baku. In the late 19th century, Baku became the Russian Empire's industrialised oil production centre. This brought many Russians to Baku, which paved the way for marriages of ethnic Azerbaijanis and other nationalities.

Baku and the rest of the country became oriented toward the Russian language. So, even nowadays, the city's lingua Franca is still as much Russian as Azeri. In 1956 by the efforts of Mirza Ibrahim, Azerbaijani became an official language. The collapse of the Soviet era was described as the "double cataclysm" for the Russian-speaking populations of the non-Russian republics of the U.S.S.R. However, only in 2001, with the approval of the declaration on language use, Azerbaijani officially became the unique official language. All other foreign languages, including Russian, were banned from governmental proceedings. Nowadays, Russian is the most common foreign language and is competing with the English language. However, Russian is almost equally utilised with Azerbaijani by Baku citizens.

Multiculturalism is one of the reasons for the multi-scaled immigration process caused by an immense population influx. Consequently, various ethnic groups melt into and create a "melting pot". The relationship within society leads to language mixing having been a mixing process. Individuals and groups are incorporated into society without losing their national identity or being restricted from their rights. Multilingualism is the coexistence of two and more cultures and cultural groups. The central aspect affecting the process is bilingualism. "The local co-grammaticality or equivalence of two languages in the vicinity of

the switch holds as long as the order of any sentences, one before and one after, the switch point is not excluded in any language" [7]. Multilingualism, at some points, could lead to the death or deterioration of the second language by the language of the privileged society.

In writing on language death, the author [7] mentioned five reasons and how to care for it. The two causes experienced and being experienced in Azerbaijan society: Linguicide when the ruling group forbids using people their languages (as in the Soviet ruling period in Azerbaijan), and the second socio-economic factor – being overwhelmed by the encroaching industrialised world. Unlike the former, one socio-economic aspect seems to be the main reason for English being utilised by an overwhelming proportion of countries worldwide and Azerbaijani.

According to the country census, Azerbaijani is spoken as a native language by 92.5% of the population. In contrast, Russian and English play significant roles as languages of education and communication. Whereas, if we look at the census of 1994, we can see that 82 % of the population spoke Azeri as FL. According to the State Statistical Committee of the Republic of Azerbaijan, out of 4472 schools, 340 are Russian-medium schools. This makes up 17 % of pupils getting their education in Russian. Despite the growing tendency toward Azeri language users, most citizens still need to utilise words belonging to 2 or more languages while interacting. Authors [6] choose the term "code-switching" "when referring to the use of two languages in the same clause, I use the term "code-switching", he mentions. If lexical items and grammatical features from two languages appear in one sentence, we use Code Switching. Very often, people code-switch consciously and unconsciously to act and talk more like those around them; according to [8], the factors affecting the emergence of code-switching in societies are: featuring migration, transnational economic and production relationships, digital media, online communications, education abroad, and other practices of communities.

As these social relations - implications affect the language. They are our independent variables. On the contrary, the SL that changes are the dependent variable. In this research, the units of observation are people from different groups. The team of analysts is the Azerbaijani language. One of the essential facts affecting code-switching is education and several Russian - medium educational institutions. According to the State Statistical Committee of the Republic of Azerbaijan, we can see the precise number of educational institutions in the soviet and post-soviet eras.

The construction of the primary analysis dataset was primarily from the Azerbaijan State Statistical Committee and from interviews and online questionnaires that cover 156 residents from Azerbaijan. All respondents answered the questions anonymously by stating their position toward this recent tendency. A close-ended questionnaire was taken from people of different ages, backgrounds, occupations, fields of expertise and people of different marital statuses. These personal answers and data help us link our observations and draw a conclusion on set hypotheses. I used the experimental method to explore why people use several language units in a sentence. The idiographic approach helps to exhaust the personal reasons for code-switching. The inquiry used for data collection is observed by deductive reasoning so that the reasons for code-switching in SLA are discovered and analysed via the answers provided. The data was presented in a descriptive form via bar charts and tables. Samplings were taken from 156 people, which gives a basis for understanding and drawing a conclusion on the positive and negative effects of the process on the people involved.

The author [7] asserts, in today's globalised world, the total number of English speakers is about 330 million, while the non-native population of the English language is nearly 430 million, which doesn't include those learning English. Nowadays, some members of the Azerbaijan community switch to English frequently, so rapid growth is experienced in the number of English medium educational institutions and students studying abroad. The article focused on studying people in the process of living their lives. However, the purpose of the study is to explore rather than to describe or explain in any traditional sense. The interviewee is from one multilingual family. The father of which is a Turkish citizen, and the mother is Azeri, whose children (8 and 9 years old girls) attend the international school. As a result of the interview, the following conclusions were drawn. Even though the people involved are members of Azerbaijan society, they mostly speak English at home by switching to Turkish and Azerbaijani languages. During the interviewing process, the most used type of code-

switching was tag-switching. When the reason is questioned, they said: "Actually, when we are very excited or happy, we want to say the word that conveys this feeling in Turkish or Azeri to feel emotionally complete. We never feel comfortable speaking in English with our family and friends because we always feel that we are in a formal setting" I asked them to construct a table of a switch for a day. The result was as follows.

Table 1 – Frequency of spoken languages in respondent's family

Switches (Languages)	Time	Interlocutors
Between English and Azeri, Turkish – mostly English	From 8 a. m. - 12 a. m.	Girls
Between Turkish and English	From 1 p. m. – 6 p. m.	Mother and girls
Between Azeri-Turkish	From 6 p. m. – 10 p. m.	Father, mother and girls

The situation above applies the symbolic interactionism paradigm, where attention is paid to how and under which circumstances people react and switch to other languages. Authors [9] mentioned in the "looking-glass self" theory, we conclude by looking into the reactions of people around us. The data were collected via the interview survey method, and interviewers were asked individual questions to discover why they switched from one language to another. The interlocutor's identity directly affects the type and time of the code-switching. As girls spent most of their time being involved in class activities, mainly in English, the first part of the day was wholly occupied with English and somehow with Azeri. The fact that the mother spends the rest of the day with them and is fluent in all three languages but that she is Azeri makes girls feel more confident in talking to her in Azeri.

On the contrary, with a Turkish father who spends only the last 4 hours with them, they tend to switch between Turkish and Azeri. The study presented is a quantitative inquiry to measure the level of people utilising two languages and their attitudes towards this tendency. The study incorporates a close-ended questionnaire to collect the data from the study's respondents. Following quantitative Research Design, the study will provide empirical evidence for the concern issue of the study. The study provides a "hypothesis forming" mode of theory generation to form a new hypothesis. One of the oldest research techniques - "a survey, is used to conduct censuses to help to analyse the issue set forth as a mode of observation. The study aims to measure the orientation and attitude of a population group toward code-switching in SLA. The survey was conducted online among 156 people living in Azerbaijan and other parts of the world. The questions provided were open-ended and close-ended so the participants could write their answers. A standardised questionnaire was administered to the selected sample of respondents, and via descriptive, explanatory methods visualised, the answers were provided. Respondents were asked to go to a web link where the survey resided. Gender-based discrimination was not employed in the study, and males and females had equal rights.

The questionnaire mentioned consists of 7 separate questions. Following the respondents filling out the questionnaire, the collected data was converted into numeric. The findings of the study are presented through graphs and tables. Each graph presents the percentage of respondents having certain attitudes. Each chart illustrates the attitudes of respondents toward the questions provided. The table below shows the rate of the second language utilised by respondents.

Table 2 – Orientation and attitude of a group of the population toward code-switching in SLA

Language	%
English	49.7
Russian	25.5
Turkish	20.3
Azerbaijani	4.5

As it is seen compared to the 19th century, almost 50 % of the respondents use English as a second language in their daily communication and make switches between English and Azeri. If the attention switched to the gender of participants, it could be seen that 105 (68.4%) of the respondents are males and 49 (31, 6 %) are females. National minorities account for only 3.3 % of survey participants. The table shows that the percentage of single and younger participants is higher compared to married and older adolescents. This makes concluding that the tendency toward code-switching into English will grow soon. Based on statistics from Azerbaijan State Statisti-

cal Committee at the beginning of the Academic year of 2017, the number of students studying abroad accounted for 2197, which is among the most critical factors affecting code-switching enumerated previously. The table below is compiled from a survey conducted among 156 respondents. The table provides six categorical variables operationalised by numbers converted into percentages and attributes correspondingly. As the table below shows, more than half of the respondents are young males, and all are educated. The interesting point about the results was that despite the survey being conducted in Azerbaijani, 3 % of the respondents were not Azerbaijani citizens, which means that people with different SL switched to Azeri due to the factors mentioned previously.

Table 3 – The percentage of single and younger participants and married and older adolescents

Variable	Attribute	%
Age	18-25	51
	26-35	31.8
	36-45	8.6
Gender	Male	68.4
	Female	31.6
Nationality	Azerbaijani	96.7
	Other	3.3
Marital Status	Married	36.9
	Single	63.1
Education	Bachelor	60
	Master	28
	PhD	8
	Doctorate	4
Occupation	Public	40
	Private Sector	34.8
	Medical	8.9
	Others	16.3

Answers to the questions directed to the respondents are described in a bar chart below.

As is seen from the bar graphs above, the reason why people address a second language is different. Even though in the first part of the article, the critical importance of education on code-switching was mentioned, this survey demonstrates that the first two factors – emphasising particular points and lacking vocabulary dominate education.

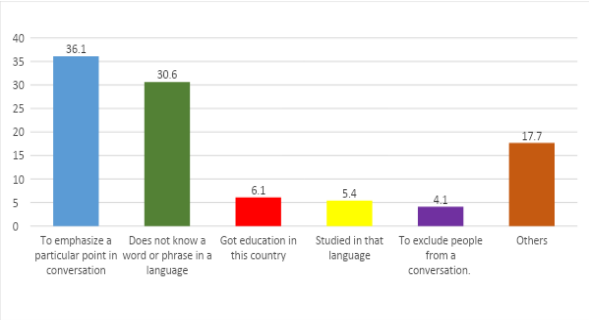


Figure 1

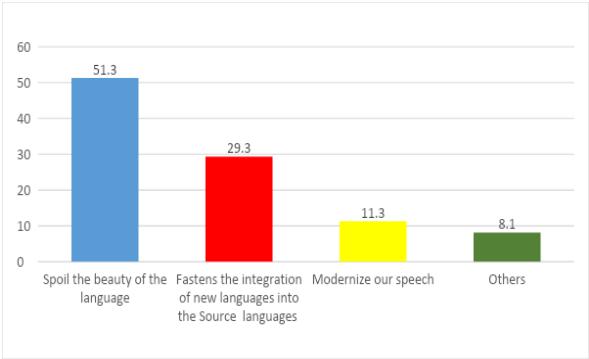


Figure 2

Based on the second figure, we conclude that more than half of the respondents opted for the adverse effects of code-switching. However, nearly 40 % see it as a sign of integration and modernisation.

CONCLUSIONS

To conclude, language is not just a tool. It is also a system of a community's cultural, political, and economic realities. Education and other socio-economic relations are vital in protecting the existence and identities of languages. The result of the survey and interviews fostered analysing of the process from both qualitative and quantitative perspectives. Respondents' attitudes toward growing tendency helped to demonstrate the position and attitudes of people from different genders, backgrounds, and occupations.

REFERENCES

1. Milroy, L., & Muysken, P. (Eds.). (1995). *One Speaker, Two Languages*. doi: 10.1017/cbo9780511620867

2. Weinreich, U. (1968). *Languages in Contact, Finding and Problems*. New York: Mouton Publishers.

3. Haugen, E. (1950). The Analysis of Linguistic Borrowing. *Language*, *26*(2), 210–231. doi: 10.2307/410058

4. Gumberz, J. (1964). Linguistic and Social Interaction in two Communities. *American Anthropologist, 66*(6), 137–153.

5. Sachdev, I., & Bourhis, R. Y. (1991). Power and status differentials in minority and majority group relations. *European Journal of Social Psychology, 21*(1), 1–24. doi: 10.1002/ejsp.2420210102

6. Sankoff, D., & Poplack, S. (1981). A formal grammar for code-switching1. *Paper in Linguistics, 14*(1), 3–45. doi: 10.1080/08351818109370523

7. Crystal, D. (2003). *English as a Global Language* (2nd ed.). Cambridge: Cambridge University Press.

8. Canagarajah, S. (2013). *Literacy as Translingual Practice Between Communities and Classrooms*. London: Routledge.

9. Sridhar, K. K., & Sridhar, S. N. (1986). Bridging the paradigm gap: second language acquisition theory and indigenised varieties of English. *World Englishes, 5*(1), 3–14. doi: 10.1111/j.1467-971x.1986.tb00636.x

10. Poplack, S., & Walker, J. A. (2003). Pieter Muysken, Bilingual speech: a typology of code-mixing. *Journal of Linguistics, 39*(3), 678–683. https://doi.org/10.1017/s0022226703272297

11. Milroy, L., & Muysken, P. (Eds.). (1995). *One Speaker, Two Languages*. doi: 10.1017/cbo9780511620867

12. Lesley. (n. d.). *Perception Is Reality: The Looking-Glass Self*. Retrieved December 1, 2022, from https://lesley.edu/article/perception-is-reality-the-looking-glass-self#:~:text=According%20to%20sociologist%20Charles%20Horton,of%20identity%2C%20socialization%2C%20and%20the

Формирование и развитие этно-топонимов на территории Азербайджана

Formation and Development of Ethnic-Toponyms in the Territory of Azerbaijan

Ogtay Dilbar Bashirova [1]

[1] *Baku Slavic University*
33 S. Rustam Street, Baku, Azerbaijan

DOI: 10.22178/pos.89-28

LCC Subject Category:
PE1001-1693

Received 25.12.2022
Accepted 26.01.2023
Published online 31.01.2023

Corresponding Author:
bashirli58@gmail.com

© 2023 The Author. This article is licensed under a Creative Commons Attribution 4.0 License

Аннотация. Этно-топонимия Азербайджана отличается уникальными особенностями. Тысячелетняя этническая и политическая история народа в той или иной степени находит отражение и в этно-топонимах. В них можно найти очень важные сведения о сложном этническом составе территории Азербайджана.

Систематическое изучение этно-топонимов способствует получению обширных знаний о древней культуре тюркских народов, их социально-политической среде. Описательно-ономалогические исследования дают четкое научное представление об исторической формации народа, в том числе о племенах, населявших эту территорию.

Ключевые слова: этно-топоним; топоним; ономастика; этимология; азербайджанский язык.

Abstract. The ethnic toponymy of Azerbaijan has unique features. The thousands of years of the ethnic and political history of the nation are also reflected in ethnic toponymy to a greater or lesser extent. They contain essential information about the complex ethnic composition of Azerbaijani territory.

Systematic study of ethnic toponymy contributes to gaining extensive knowledge of Turkic peoples' ancient culture and socio-political environment. Descriptive-nomological studies provide a clear scientific idea of the historical formation of the people, including the tribes that inhabited the territory.

Keywords: ethno-toponym; toponym; onomastics; etymology; Azeri language.

ВВЕДЕНИЕ

Этно-топонимы – это географические названия, которые образуются на основе различных типов этнической общности (нация, народ, племя, племенные объединения и т.д.). Сложная этническая система населения отражена в этно-топонимах и в Азербайджане. Происходит получение ценных материалов об историческом формировании этнического состава, направлениях миграций, межплеменных этнических ареальных контактах и многом другом. Многочисленные этно-топонимы дают сведения о древнем азербайджанском социуме.

Топонимисты предлагают три фактора образования топонимов: географический, этнографический и историко-социальный. Этно-топонимы же образуются на основе этих факторов. Каждый этно-топоним называет социальную биографию народа.

На территории Азербайджана существует множество этно-топонимов, которые отражают историю и культуру этносов, населяющих эту территорию на протяжении многих веков. Формирование этно-топонимов на территории Азербайджана началось задолго до нашей эры и было связано с появлением первых этносов и формированием их культурно-языковых особенностей.

В разные исторические периоды на территории Азербайджана происходили миграции народов, завоевания, смены правителей и

культурные влияния со стороны различных народов. В результате этого процесса формирования этно-топонимов на территории Азербайджана существует множество названий, которые имеют различные языковые и культурные корни. Например, многие названия географических объектов на территории Азербайджана имеют корни в персидском и тюркском языках, так как эти народы оказывали культурное влияние на регион на разных этапах истории.

В современной Азербайджанской Республике происходит активное развитие этно-топонимов, связанное с развитием географической и научной информации о регионе, а также с общей мировой тенденцией к уважению культурного наследия и сохранению исторических памятников. Например, в настоящее время в Азербайджане проводятся работы по обновлению топонимических карт и справочников, а также по увековечению и сохранению исторических мест и памятников.

Таким образом, формирование и развитие этно-топонимов на территории Азербайджана является длительным процессом, связанным с историей и культурой народов, населяющих этот регион. В современном мире сохранение этно-топонимов и уважение к культурному наследию становится все более важным, и в Азербайджане активно проводятся работы по развитию этого направления

Формирование и развитие этно-топонимов на территории Азербайджана имеет несколько актуальных аспектов:

1. Культурное наследие. Этно-топонимы являются частью культурного наследия народов, населяющих территорию Азербайджана. Изучение и сохранение этно-топонимов является важным аспектом сохранения культурного наследия региона.

2. География и наука. Этно-топонимы играют важную роль в географической информации и научных исследованиях. Изучение этно-топонимов позволяет получить информацию о географии, истории и культуре региона, что может быть полезным для научных исследований.

3. Политический аспект. В свете политических изменений и конфликтов в регионе, изучение и сохранение этно-топонимов на территории Азербайджана может быть важным фактором для укрепления национальной идентичности и сохранения культурных традиций.

4. Туризм и экономика. Сохранение и продвижение этно-топонимов может способствовать развитию туризма и экономики региона. Многие туристы интересуются историческими и культурными достопримечательностями, и этно-топонимы могут стать одним из привлекательных факторов для туристов.

Задачи исследования формирования и развития этно-топонимов на территории Азербайджана включают в себя изучение исторических, культурных, географических, политических, экономических и социальных аспектов этой темы с целью понимания значимости и роли этно-топонимов в культуре, истории и развитии региона.

МЕТОДЫ И МАТЕРИАЛЫ ИССЛЕДОВАНИЯ

Исследование формирования и развития этно-топонимов на территории Азербайджана может использовать разнообразные методы и материалы, в зависимости от конкретных задач исследования. В данном исследовании были использованы исторический анализ, географический анализ, лингвистический анализ, антропологический анализ, этнографический анализ.

Материалами исследования являются исторические документы, архивные материалы, исторические карты и другие источники, содержащие информацию о происхождении и изменении этно-топонимов на территории Азербайджана. Так же были использованы карты и данные геоинформационных систем для изучения географического распределения этно-топонимов, литературные произведения, поэзия и другие искусственные тексты, содержащие этно-топонимы, результаты этнографических исследований, включая интервью с местным населением.

РЕЗУЛЬТАТЫ ИССЛЕДОВАНИЯ

Классификация этно-топонимов Азербайджана

Этно-топонимы Азербайджана носят исторический, структурно-типологический и семантический характер: 1) исторические сведения об этно-топонимах Азербайджана образуют

соответствие с этно-топонимами регионов проживания других тюркских народов; 2) повторяющиеся ойконимы иногда различаются по определению ойконима; 3) ойконим носит этнонимический характер, семантически выражен.

«Этот лексический пласт, сыгравший определенную роль в создании и формировании ряда топонимов, отражает древнейшие фонетические, лексические, семантические и грамматические элементы азербайджанского языка» [8, с. 106].

Этимология – это отрасль науки, изучающая исконное, основное значение слова. В «Толковом словаре лингвистических терминов» дается следующее объяснение этому термину: *Etymoloqos* – греческое слово, означающее *etymon* – истинный, действительный, *loqos* – наука. В современной лингвистике слово этимология употребляется в основном в двух значениях. Во-первых, он используется в значении происхождения и истории слова или морфемы, а во-вторых, в значении науки, изучающей историю слова и морфемы» [5, с. 133]. В связи с этим важными вопросами являются изучение фонем в составе этно-топонимов и применение фонетических последовательностей, переходов, сокращений и воспроизводства звуков. С помощью этимологического анализа также можно определить первичное значение этно-топонимов во многих языках, их общие связи. В это время уточняются историчность, современность языка и связи между ними.

О племенах, проживающих на территории Азербайджана, в книге «История азербайджанского языка» автор Г. Казымов пишет: «...В течение всей последующей пятилетней письменной истории территория проживания аборигенных азербайджанских племен была ограничена Дербентом на севере, Каспийским морем на востоке, двумя междуречьями на Западе и Хамаданом на Юге. Аборигенное население всегда стабильно жило на своем месте, с развитием земледелия и скотоводства ряд подразделений основных племен на территории нашей страны еще с мезолита распространился на запад до Балкан, на восток до Алтая, на север до верхнего побережья Черного моря. Много было и тех, кто приезжал в нашу страну с севера через Дербентский проход, а снизу через южный берег Каспия. Только когда они были тюркоязычными, они смешивались с местным населением и участвовали в этническом составе нашего народа. Ряд кавказо-язычных племен на севере и ряд ирано-язычных племен на Востоке были вечными спутниками нашего народа» [5, с. 65].

В целом, этно-топонимы, сформировавшиеся и развивающиеся на территории Азербайджана, исторически существовавшие в этом регионе, можно сгруппировать следующим образом:

1) древнейшие этно-топонимы*: Örənqala, Şirvan, Arran, Muğan, Ləki* и др.

2) этно-топонимы, возникшие на основе древних, средневековых огузских племенных и родоплеменных объединений: *İqdir/Eqdir, Emir /İmir* и др.

3) Этно-топонимы, возникшие на основе азербайджанских племен: *Salur/Salır/Salor/Sakar, Abdal, Gəncə/Gence* и др.

Азербайджанская система топонимов включает в себя самые древние, новые и новейшие топонимы по истории их образования. В этом конкретном случае периодизация, связанная с этно-топонимами, также может быть проведена соответствующим образом. Топонимы, входящие в каждую из этих периодизаций, являются важнейшими источниками, которые наиболее ярко и точно отражают этнические процессы и до сих пор сохраняют названия многих этносов, участвовавших в создании этого народа, в частности, тюркских племен и племенных союзов. «Топонимические названия являются важным вспомогательным историческим источником, помогающим решить проблему образования азербайджанского народа» [1, с. 70].

Так как основу азербайджанского народа составляют тюркские племена, то из сочетания этих компонентов, родственных языку и этнической принадлежности, сложился единый азербайджанский народ и общенародный азербайджанский язык. Для других племен на территории Азербайджана этот язык был средством общения. Существует такое утверждение, что многочисленные этно-топонимы, зарегистрированные на этих территориях, свидетельствуют о существовании азербайджанского языка с более древних времен [2, с. 136]. Мы также упомянули об

этом выше и полностью согласны с мнением авторов.

Автор Т. Гаджиев, исследуя топонимы Джебраила, трактует этот вопрос так: «Этнический состав населения на любой территории никогда не был стабильным, люди из поколения в поколение – племена, народы – менялись местами в разных направлениях, добровольно-невольно, по желанию или в результате насильственных войн, в результате миграций этносы на территориях расселения либо полностью, либо частично обновлялись. Правда, человечество развивалось на едином языковом корне, но развитие человечества шло по пути возникновения разных языков – разных языковых семей на основе диалектных различий на протяжении 50 тыс., 100 тыс. лет и родственных языков на основе различий в пределах этих языковых семей на протяжении тысячелетий» [4, с. 21]. Скорость изменения этносов влияла на языки, приводила к тому, что язык коренного населения либо полностью исчезал, как и само население, либо обогащался за счет родственных этносов, к скрещиванию различных языков. Все это претерпело изменения поколений и племен, языковые изменения до такой степени, что мы не можем себе представить, названия объектов, зарегистрированных на территориях, также обновлялись с каждым новым прибытием и претерпевали полные или частичные изменения. Эти представления относятся к древнейшим этно-топонимам, исторически сложившимся на территории Азербайджана.

Этимология некоторых этно-топонимов Азербайджана

На территории Южного Кавказа очень мало сведений о древних этносах. О времени, когда некоторые из них поселились здесь, и о границах зон, в которых они поселились, ничего не известно. Эти зоны мы определили, в основном, на основе древних этно-топонимов. Однако трудно определить время возникновения этих этно-топонимов. Понятно, что «географическое название, отражающее название какого-либо племени, могло возникнуть после заселения этого племени и впоследствии упоминаться в источниках, но сколько времени охватывает это «позднее» по времени? – это невозможно прояснить» [4, с. 119].

Этно-топоним «алпан». Одним из древнейших этно-топонимов на территории Азербайджана является название села Алпан в Губинском районе. Как указывает автор Э. Ахмедова, ученый А. Бакиханов в своих письмах упоминает, что в Губе есть село под названием *Алпан*, которое могло быть изменено от слова «албан» [1, с. 21]. Источники иногда ошибочно отмечают связь топонима *албан* с латинским словом *Albus*, означающим «белый» [1, с. 123]. В более поздних исследованиях было показано, что это мнение не соответствует действительности [2, с. 30].

В другом исследовании отмечается, что «Алпан – бог огня – является одним из могущественных богов. Алпану ненавистны скверна, пятнающая человека, убийство, прелюбодеяние, ложь, воровство. Человек, осквернивший себя каким-либо грехом, обязан был пройти очистительные обряды. Любой проступок наказывался очень строго: не только преднамеренное убийство, но и всякое пролитие крови, в том числе крови животного и птицы, требовало очищения. Даже простое прикосновение к убийце или разговор с ним считались тяжким преступлением» [3, с. 111].

Название перевала Алвандере, расположенного на юго-восточной стороне руин города Габала на территории Габалинского административного района между ущельем Турьянчай и ущельем Гейчай, связывают с именем албанцев, считавшихся крупнейшим племенем, населявшим территорию древнего албанского государства [1, с. 127].

Автор Г. Казимов в своих исследованиях разделяет мнение о названии албанского этноса: «Название албанского этноса впервые появляется у Арриана, автора II века, в связи с битвой при Гавгамелах, произошедшей в 331 году до нашей эры между иранской армией и армией Александра Македонского» [5, с. 171].

Некоторые исследователи выдвинули различные гипотезы о том, что ряд этносов, проживающих на территории Азербайджана, являются «албанцами». Одна из них связана с тем, что лезгины являются этническими албанцами. Предки лезгин, жившие на переходе между Северным Кавказом и Передней Азией, на протяжении тысячелетий были свидетелями великих миграций и армий. На протяжении всей истории проживающая в Албании часть лезгин, как составная часть албанцев, была единым целым с ней в борьбе этого

народа против иноземцев. Однако никогда лезгины не носили этнического названия «албанцы», а только в общем смысле – лезгины – албанцы и азербайджанцы, так как жили в древности в Албании, а ныне в Северном Азербайджане, в то время как в конкретном смысле племя, носившее этническое название албанцев, имело тюркское происхождение [5, с. 173-174].

«Тот факт, что кавказские народы состоят из различных малочисленных племен-этносов, свидетельствует о том, что они не смогли так организованно бороться с «давлением» с юга, что, по-видимому, это «давление» еще больше разделило их, разделило на разные части, между которыми постепенно сформировались и углубились диалектно-языковые различия. Однако, вытесненные на север Азербайджана (а оттуда и на Северный Кавказ) кавказские этносы создали албанское государство, о котором широко говорится в источниках различного характера. В последние века до нашей эры, а также в первые века нашей эры север Азербайджана населяли в основном племена *ути, гирдман, гаргар,* которых исторические источники в общих чертах называют “албанцами” или “агванами”» [2, с. 17].

Исторические, общественно-политические процессы, происходящие на территории исторического проживания, оказывают сильное влияние на вытеснение этносов, что находит свое отражение в языке этого этноса. На данной основе постепенно возникают языково-диалектные различия.

В книге по истории Азербайджана есть такие упоминания об албанском названии, его значении: «Интерпретация, выдвинутая в последнее время о названии «албанец», более правдоподобна. Согласно этой интерпретации, название «Албан» используется туркменами и казахами как этноним тюркского происхождения. У туркмен остался этноним «Алпан», а у казахов – «Албан». Алпанцы // албанцы обозначают определенные тюркские племена в Средней Азии. В таком случае этноним «албанцы» возник на основе древнетюркского слова ALP//ALB, означающего «храбрый, отважный». А «-an» в названии – это суффикс, обозначающий принадлежность или множественное число. В полном соответствии с этим объяснением имя «албанец» означает «храбрые, отважные». Это мнение, объяснение подтверждает и характеристика «храбрый, отважный», которую античные авторы применяли к албанцам. Отсюда можно сделать вывод, что тюркские племена были широко представлены в составе населения Албании» [2, с. 147].

Некоторые албанские сельские названия существуют на территории Азербайджана, и эти этносы сыграли особую роль в этногенезе азербайджанцев. Албанцы не являются иранскими этносами *Манна-Мада-Атропатена*, как указывают некоторые историки. Албанский этнос имеет тюрское происхождение. Историки указывают, что территория Северного Азербайджана с IV века до нашей эры в античных источниках называется Албанией. Конечно, из того, что впервые название Албании и албанцев было упомянуто в связи с событиями IV века до нашей эры, нельзя сделать вывод, что они существовали здесь с этого века. Просто нет источника, который упоминал бы об Албании до этого века. Во всех древних источниках древнее население территории Северного Азербайджана называется албанцами.

На наш взгляд, уточнить этническую принадлежность любого этноса можно только, историко-лингвистическим путем. Как отмечает автор Г. Казимов, ученый Г. Гейбуллаев делит албанские топонимы I тысячелетия нашей эры на две части:

1) этно-топонимы, отражающие названия древних племен и народов, населявших Албанию: *Abant, Arajank, Arandjanak, Qanzak, Qoroz, Kanrapk, Kolb, Kolt, Mets-Arank, Mets-Kolmank, Pazkank, Trtuqet, Tuç-Katak, Çol (Çul), Çor, Xarqlan, Xunanakert, Şakaşen, Şəki* и др. Эти имена содержатся в дошедшей до нас на армянском языке книге «Албанская история». Их формы в азербайджанском языке – *araz (Arasbar), aran, qarqar, gəncə, kəngər, peçeneq (biçənək), tərtər, kol, çul, çur, hun, sak (şaka)* и др. Они составили компонент в формировании азербайджанских этно-топонимов. Например, *Arazaxan körpü* (Джебраильский р-н), *Aran yeri* (Физулинский р-н), *Qarqar çayı, Gəncə şəhəri, Biçənək yaylağı* (Нахчыванский р-н), *Qarakollu kəndi* (Джебраильский р-н), *Çullu kəndi* (Джебраильский р-н), Hunlar kəndi (Исмаиллинский р-н), *Şəki* и все другие названия тюркского происхождения» [5, с. 73-138].

В ходе истории названия *Alpan* сформировался ряд вариантов: *Alban – Ağvan – Ağvanq – Alvan – Aran.*

2. Вторая часть топонимов – это названия, обозначающие ландшафт, что не составляет предмет нашего исследования.

Отмечается, что в названии гидронима реки *Alpan*, находит свое отражение название племени, которое в свое время проживала в районе Лачин Азербайджанской Республики: «Так как река протекает вблизи села *Şəlvə*, то по названию этого села названа река *Şəlvə*» [1, с. 100]. Раньше река называлась *Alpan*. Он пишет: «Слово *Şəlvə* на курдском языке означает «мутная вода». Тот факт, что прежнее название реки было *Alpan*, а одноименный топоним повторялся и в Ходжалинском районе, свидетельствует о том, что рассуждения неубедительны» [1, с. 90].

Одним из этно-топонимов, обозначающих древнейший этнос на территории Азербайджана, является название села *Kəmərli*. В минувшем столетии на территории Армении и Азербайджана, в его западном регионе было большое количество сел, называемых *Qəmərli, Kəmərli*. На территории Ирана же зафиксированы азербайджанские села *Komar, Kemer, Kamara, Kamarabad, Qemar, Qamarabad* (эти названия адаптированы к фонетике персидского языка). Эти этно-топонимы отражают название древнейших «киммерийцев». Подробны сведения о киммерийцах, данные автором V века до нашей эры Геродотом: «Киммерийцы жили на северном побережье Черного моря. Когда скифы из Средней Азии внезапно появились в их стране, киммерийцы собрались на собрания, чтобы обсудить сложившуюся ситуацию. Рядовые киммерийцы заявили, что не хотят сталкиваться со скифами, и поэтому посоветовали собраться вместе и переехать в другое место» [5, с. 162].

Одним из этно-топонимов, связанных с названием древнейшего этноса на территории Азербайджана, является название села *Göyərçinli* (Джебраильский район). Те или иные названия деревень отражают название племени *Kuyarçi*.

Фактически этноним *kuyarçi* произошел от этнонима *kuqar* (по Баскакову, в языке древних печенегов звук “q” в других тюркских языках произносился как “y”). Название племени *Quqarçi* осталось в топонимах как *Göyərçi (Göyərçin)* и *Göyərçinli*. В Азербайджане также есть села *Göyərçin* и *Göyərçinli* [4, с. 70]. Это связано с названием птицы: «В связи с названием *Göyərçin* возникли следующие топонимы: *Göyərçin qayası* (Геранбойский, Лачинский, Самухский районы), *Göyərçinli dağ* (Абшеронский и Джебраильский районы), *Göyərçinli təpə* (село Минкенд Лачинского района) и другие. Причиной появления оронимов, названия которых отмечены, была птица-голубь, встречающаяся там [1, с. 108].

Мы не согласны с этим мнением. На наш взгляд, эти топонимы связаны не с именем птицы, а с названием племени «*kuyarçi*», как указывалось в предыдущих исследованиях.

«Деривационные потенции топооснов в рамках внутрикатегориального словопроизводства не исчерпываются функцией выступать в качестве производящих основ только этнонимов. От топооснов могут быть образованы многочисленные существительные разных семантических групп» [6, с. 758]. Топонимы, в том числе этно-топонимы, занимают важное место в ономастическом пространстве языка. В связи с этим этно-топонимия Азербайджана отличается от этно-топонимических слоев других стран своими уникальными особенностями. Тысячелетняя история азербайджанского народа – культурная, этническая и политическая – в той или иной степени находит свое отражение и в этно-топонимах, сохраняя свои следы. Значительные сведения об очень сложном и противоречивом этническом составе Азербайджана можно получить и через этно-топонимы.

Этно-топонимы возникают на основе названий племени, народа, рода и др. Например, *Axtaçı, Balıqçı, Kəpənəkçi, Keçili, Ləki, Aşağı Ləki, Orta Ləki, Qılıçlı, Bəydili kəndi, Oğuz rмaayonu, Qıpcaqlar kəndi, Bucaq kəndi* и др.

Этно-топонимы Азербайджана являются исторически активной категорией, живым источником информации, до наших дней сохраняющей в этнических единицах историю, культуру, этнографию, фольклор и язык древних племен, народов. Более глубокое изучение этнографической и этнической истории азербайджанского народа возможно через эти единицы. Корпус этно-топонимов Азербайджана в языковом отношении базируется на этнической основе. Эти основы состоят из племенных названий: *Türkoba kəndi, Bucaq kəndi, Qıpçaq kəndi* и т. д.

Этно-топонимика как наука богата лингвистическими фактами. Известно, что этно-топонимы считаются одними из древнейших пластов систем названий.

Лингвист В. Никонов выдвинул такое мнение о происхождении этно-топонимов: «Если топонимы, основу которых составляет этноним, названы людьми, не проживающими на данной территории, то они не могут распространяться на ту территорию, где проживает единый этнический народ. Этнонимы, выполняющие, как правило, функцию дифференциации этнической принадлежности населения, называются этно-топонимами» [7, с. 13]. Мы согласны с этим мнением. На наш взгляд, топонимы являются продуктом этнической памяти коренного населения и лучшим средством еще раз доказать этническую принадлежность населения.

ВЫВОДЫ

1. Этно-топонимы Азербайджана имеют исторический, структурно-типологический и семантический характер. Исторические сведения об этно-топонимах Азербайджана соответствуют этно-топонимам других тюркских народов. Ойконимы, повторяющиеся в Азербайджане, иногда отличаются по определению. Ойконимы носят этнонимический характер и выражают семантику.

2. Этимология позволяет изучить происхождение и историю слова или морфемы. Этимологический анализ позволяет определить первичное значение этно-топонимов в различных языках и их общие связи. На территории Азербайджана проживали аборигенные племена, которые в процессе развития земледелия и скотоводства распространились на другие территории.

3. Существует различные мнения относительно происхождения топонима *Göyərçin*, однако исследователь считает, что название связано с именем племени *kuyarçi*, которое находилось в степях Южной Руси в раннем Средневековье.

СПИСОК ИСПОЛЬЗОВАННЫХ ИСТОЧНИКОВ / REFERENCES

1. Akhmedova, E. (2017). *Azärbayjan etnonimläri (leksik-semanik vä struktur özällikläri)* [Azerbaijani ethnonyms (lexical-semantic and structural features)]. Baku: n. d. (in Azerbaijani).

2. Gurbanov, A. (1985). *Müasir Azärbayjan ädäbi dili* [Modern Azerbaijani literary language]. Baku: Maarif (in Azerbaijani).

3. Gusejhanova, Z., & Shihalieva, Je. (2022). Religiozno-mifologicheskie obrazy v anglijskoj i lezginskoj jazykovyh kartinah mira [Religious and mythological imagery in the English and Lezgi language world pictures]. *Vestnik Dagestanskogo gosudarstvennogo universiteta. Serija 2: Gumanitarnye nauki, 4, 109–116* (in Russian).

4. Hadzhyjev, T. (1984). Azərbaycan dili və türk etnik konsepsiyaları haqqında [About Azerbaijani language and Turkish ethnic concepts]. In *Mugajisəli-tarikhi turkologijanyn aktual problemleri*. Baku: AUİ (in Azerbaijani).

5. Kazymov, Q. (2017). *Azərbaycan dilinin tarixi (ən qədim dövrlərdən XIII əsrə qədər)* [History of the Azerbaijani language (from the earliest times to the 13th century)] Azerbajdzhan dilinin tarikhi (en gedim dovrlerden XIII esre geder). Baku: TEAS Press (in Azerbaijani).

6. Murjasova, R. (2013). Toponimy v sisteme jazyka [Toponyms in the language system]. *Vestnik Bashkirskogo universiteta, 18*(3), 753–762 (in Russian).

7. Nikonov, V. (1964). *Toponimika v istoriko-geograficheskoj etnografii* [Toponymy in historical and geographical ethnography]. Moscow: n. d. (in Russian).

8. Yusifova, N. (2013). Ojkonimy tjurkskogo proiskhozhdenija [Oikonyms of Turkic origin]. *Vestnik Tomskogo gosudarstvennogo pedaqoqicheskoqo universiteta, 3*, 106–110 (in Russian).

Comparative Analysis of the Effectiveness of Polymerase Chain Reaction and Microscopy in Malaria Diagnosis

Ismail Muhammad [1], **Tanko Mahmoud Mohammed** [2], **Asiya Muhammad Usman** [3], **Bala Abubakar** [4]

[1] *Gombe State University*
P. M. B 127, Tudun Wada Gombe, Gombe State

[2] *Federal Polytechnic Mubi*
P. M. B. 35, Mubi, Adamawa State, Nigeria

[3] *Federal College of Horticultural Technology, Dadin Kowa*
P. M. B. 108 Dadin Kowa, Gombe, Gombe State, Nigeria

[4] *Modibbo Adama Federal University of Technology, Yola*
P. M. B. 2076, Yola, Yola Adamawa State, Nigeria

DOI: 10.22178/pos.89-21

LCC Subject Category: QH301-705.5

Received 10.12.2022
Accepted 28.01.2023
Published online 31.01.2023

Corresponding Author:
Ismail Muhammad
muhammadismail5609@gsu.edu.ng

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. Malaria is a life-threatening parasitic disease which causes enormous morbidity and mortality in tropical African countries. Successful prevention and treatment of infected individuals heavenly depend on successful diagnosis using recommended techniques. These routine laboratory techniques have different performance indices. Therefore, this study aimed to evaluate the performance of Polymerase Chain Reaction and Microscopy in malaria diagnosis. A total of two hundred consented study subjects were randomly selected and enrolled for the research. Vein puncture technique was use to collect venus blood from the subjects and analysed using microscopy and Polymerase chain Reaction. DNA samples were extracted using Quick-DNA™ Miniprep Plus Kit with catalogue No. D4069. 18SrRNA gene of *Plasmodium falciparum* from chromosome 13 was amplified using the primers F5'AACAGACGGGTAGTCATGATTGAG3' R5'GTATCTGATCGTCTTCACTCCC3'. Malaria prevalence of 167(83.50%) and 105(52.5%) were recorded using microscopy and Polymerase Chain Reaction. Microscopy had a sensitivity, specificity, Positive predictive value and negative predictive value of 84.91, 23.40, 55.53 and 57.89%, respectively, with an overall accuracy value of 0.81. Polymerase Chain Reaction had a sensitivity value of 53.89%, specificity of 54.54%, positive predictive value of 85.79% and Negative predictive value of 18.94% with an overall accuracy of 0.54. Microscopy and Polymerase Chain Reaction demonstrated significant accuracy and relatively good performance indices. Therefore Microscopy and Polymerase Chain Reaction are highly recommended as malaria diagnostic techniques, and further research should be carried out to determine the influence of some biological factors of both the parasite and the host on the outcome of the diagnosis using both Polymerase Chain Reaction and microscopy.

Keywords: Malaria Diagnosis; Polymerase Chain Reaction; Microscopy; Sensitivity; Specificity; Accuracy.

INTRODUCTION

Malaria is an ancient parasitic protozoan disease caused by five parasites (*Plasmodium falciparum, P. vivax, P. malariae, P. ovale and P. knowlesi*) belonging to the genus Plasmodium [1]. *Plasmodium falciparum* is the most predominant specie in sub-Saharan Africa, causing severe disease and death, particularly in young children, usually less than five years of age, pregnant women and immunocompromised individuals [2, 3]. Also,

P. knowlesi causes acute, severe illness but with a low mortality rate [4]. The disease is a significant public health problem in the tropic, especially in Nigeria, where climatic conditions favour the survival of both the parasite (*Plasmodium* specie) and the vector (female Anopheles mosquito) [5, 6]. In 2018, there were 228 million estimated clinical cases of malaria infection and 405,000 malaria-related deaths [7, 8]. Sub-Saharan Africa bears more than 90% of the global malaria cases, with more than 93% of all deaths [9].

Accurate malaria diagnosis is a pillar of malaria control and elimination [10]. Therefore, the only clinical approach is usually discouraged and insufficient for establishing the presence or absence of malaria parasites. This is because such a presumptive diagnosis cannot be entirely relied upon, as the presentation of malaria is highly non-specific and imitates various similar clinical conditions [11]. Therefore, World Health Organisation recommends that all clinically suspected malaria cases be confirmed with parasitological diagnosis, using either a malaria-specific Rapid Diagnostic Test (RDT) or direct visualization of the parasites or their product using microscopy before treatment [12, 13]. Fever, which is usually associated with chills, perspiration, anorexia, headaches, vomiting, high body temperature and malaise, is the most prominent clinical sign and symptom of malaria infection, and quite several people residing in endemic areas of malaria transmission are fully aware of these symptoms, thus led to self-diagnosis and in most cases self-treatment. According to the global malaria policy of universal testing and treatment, detection of malaria cases should be within the first 24 h [14]. Therefore, in the last few decades, there has been a rapid increase and advancement in developing novel malaria diagnostic techniques [15].

Presently, diagnostic and reference laboratories adopt several techniques, which include microscopy, molecular assays (Polymerase Chain Reaction), and serological assays [16]. Still, microscopy remains the mainstay and gold standard technique in most areas where malaria is endemic. Nevertheless, with all this dependence on microscopy, there are some shortcomings attached to it, which include subjective parasite identification and counting by microscopists [17], inherent errors due to sample handling [18], inability to detect mixed species infection especially when it involves *P. ovale* and *P. vivax*, the lower detection limit of between 4–20 parasites/ml even for expert microscopists and lack of steady and interrupted power supply in most malaria-endemic countries [19] and in some instances, it may tend to give either false positive or false negative result [20]. Polymerase Chain Reaction (PCR) is a well-known molecular technique that uses the parasite's DNA or RNA (nucleic acid) to diagnose an infectious agent. The method is susceptible and specific as it can detect infectious agents at densities below the threshold level of other conventional techniques. PCR can see, for example, malaria parasites at densities below the threshold level of detection of either microscopy or RDTs [21]. For *Plasmodium falciparum* diagnosis using PCR, 18SrRNA genes are amplified [22]. Unlike other techniques, especially microscopy and RDTs, which are considered less expensive and cumbersome, this Molecular-based technique is relatively expensive and requires a high level of expertise [23]. Malaria diagnostic techniques include Loop-mediated isothermal amplification (LAMP) and flow cytometry. Though PCR is costly, some laboratories and other research institutions adopt it, especially when other conventional diagnostic techniques fail to produce the required and expected result. Therefore this study aimed to compare and evaluate the performance of PCR and microscopy in malaria diagnosis, as there is a lack of data in that regard in the study area.

MATERIAL AND METHODS

Study Area. The study was conducted in Gombe Local Government Area, Gombe State, Nigeria. The Local Government lies between 11°14′07″E and 11°4′42″E, and Latitudes 10°16′48″N and 10°17′24″N with a total land mass of 52 km^2. According to National Population Commission, the Gombe Local government has a projected population figure of 367,500 people (3.3% annual change). The vegetation of the Local Government is typical of that of Gombe State, which is Sudan savannah and experiences two distinct seasons, the dry season, which usually commences in November-March and the rainy season from April-October, with a mean annual rainfall of 863.2 mm. Agriculture is the primary occupation in the region (mostly Peasant farmers) while some engage in business and few are a civil servant. The local Government being the state capital of the state, both the tertiary (Federal Teaching Hospital) and the secondary (Gombe State Specialist Hospital) health facilities of the state are domiciled in the local Government. This is also in addi-

tion to the primary health care centres strategically located in each local government ward. Also, several private hospitals provide different services, including malaria diagnosis and treatment.

Ethical consideration. The research proposal was submitted to the Gombe State Ministry of Health for approval, after which the consent was communicated via a later MOH/ADM/621/VOL. I/222.

Consent of the Subjects. Before collecting a blood sample from the study subjects' verbal and or written consent of the issue was sought after briefing them on the research and the need for them to participate. In a situation whereby the subjects were not mature enough, consent of his/her parents/guardian was sought. All the subjects were assured that all information collected from the study subjects would be strictly used for the research and treated with high confidentiality. In addition, quality control and assurance were assured when handling and treating each sample.

Study Subjects and Inclusion Criteria. A total of two hundred study subjects comprised of males and females of different ages who willingly and voluntarily agreed to participate in the study were used as the subjects for the research. Three recruitment centres were selected: Gombe town maternity (Gidan Magani). Only patients who reported themselves to the selected hospitals (Gombe Town Maternity (Gidan Magani), Sunnah Clinic and Idi Children and Women Hospital Gombe.) with symptoms of malaria (fever) or a history of madness in the last 24 hours and referred by a physician for the screening of malaria infection and in addition they have not used any antimalarial drugs 60 days before the data collection, only subjects with *Plasmodium falciparum* mono-infection were recruited.

Blood sample collection and analysis. The vein puncture technique was used to collect Venus's blood samples with the help of medical personnel. Briefly, a Soft tubing tourniquet was fastened onto the upper arm of the respondents to enable the index finger to feel a suitable vein. The puncture site was then cleaned with methylated spirit (methanol), and venepuncture was made with a needle attached to a 5 ml syringe. When sufficient blood samples had been collected, the tourniquet was removed, and the hand was extracted immediately. The blood was transferred into an EDTA container to the laboratory for analysis.

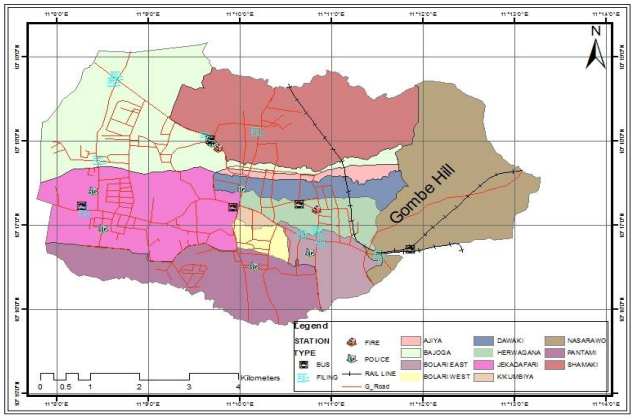


Figure 1 – Map of Gombe Local Government Area

Microscopy. The collected blood samples were analyzed within 1 to 2 hours after collection. Thick and thin films were prepared according to the standard film preparation technique. A drop of blood sample was placed on the centre of grease-free slides. After which, the reverse side of the slides was cleaned with cotton wool, allowed for air-drying, and stained with Giemsa stain for 60 minutes. After which, the slides were washed off gently with clean water. The drops were placed on a rack to air-dry for eventual examination of the drops under the microscope, using oil immersion at 100× magnification to observe for *Plasmodium* parasite. The presence of ring forms and or Trophozoites of *Plasmodium* indicated positive results. In contrast, the absence of either Trophozoites or ring form indicates negative effects after 10 minutes of a thorough examination by a qualified microscopist under a 100 × high power field of the microscope.

Molecular analysis

DNA Extraction. The DNA was extracted using Quick-DNA™ Miniprep Plus Kit with catalogue No. D4069 from Zymo research. Techniques and procedures outlined and recommended by the manufacturers were strictly adhered to. Briefly, 200 µl of biofluid and cell buffer was added to the pieces of the filter paper containing the dried blood sample in the Eppendorf tube. After which 20 µl of proteinase K was added and mixed thoroughly and incubated at 55 °C for 10 minutes to digest the various component of the sample. After which, 200 µl of genomic binding buffer was added. The mixture was then transferred into a zymo spin column in a collecting tube and centrifuge in a refrigerated centrifuge at 1200 rpm for 1 minute. After which, the collecting tube was discarded with the follow-through. 400 µl of DNA pre-wash buffer was added to the column in a

new collection tube and centrifuged for 1 minute. This was followed by adding 700 µl of genomic DNA wash buffer and centrifuge for 1 minute. After which, 200 µl of Genomic buffer was added and centrifuged for 1 minute. The tube was then discarded with the follow-through. Finally, to elute the DNA, 50 µl of DNA elution buffer was added and incubated for 5 minute and then centrifuged for 1 minute.

DNA Confirmation and Purity and Concentration determination. To confirm the presence of DNA in the entire sample extracted, gel electrophoresis was run in 2% agarose stained with 0.5 µl of ethidium bromide and was allowed to run for 1 hour at 100 mA, after which the gel was visualized using Ultraviolent (UV) Trans illuminator. Nanodrop Spectrophotometer was used to determine the concentration and purity of the DNA extracted.

Primers. The primer (F5'AACAGACGGGTAGTCATGATTGAG3' and R5'GTATCTGATCGTCTTCACTCCC3') used were adopted from the work of [24] and validated. All validated Primers were sent to Inqaba biotech Africa's genomic company for synthesis and supply. The primers were Reconstituted/ diluted using the recommended dilution factor (appropriate amount of distilled water) as specified by the manufacturer and stored at -4 °C as stock solution. The actual working solution was obtained by diluting 10 µl of the stock in 90 µl of Nano pure water making (10%).

Amplification of 18Sr RNA gene of Plasmodium falcifarum. The amplification was carried out using a Classic DW-K960 thermal cycler. The reaction was carried in a 25 µl reaction mixture containing 5 µl of the extracted DNA as the template, 1 µl of primer (0.5 µl each of F5'AACAGACGGGTAGTCATGATTGAG3' R5'GTATCTGATCGTCTTCACTCCC3'), 6.5 µl distilled water and 12.5 µl of the PCR Master mix (Containig dNTPs, Mgcl2 and Taq DNA Polymerase). The gene was amplified by setting an initial denaturation at 95 °C for 15 minutes, followed by forty (40) cycles of denaturation at 94 °C for 45 seconds while annealing at 60 °C for 90 seconds and extension at 72 °C for 1 minute. The final extension was carried out at 72 °C for 5 minutes. This band size of 276 bp was used as a control for the confirmation of *Plasmodium falciparum*, while distilled water was used as a negative control for all PCR in the research.

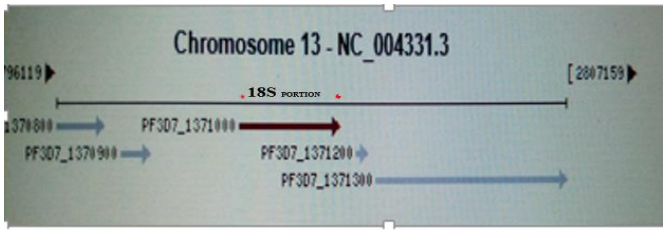


Figure 2 – Chromosome 13 of *Plasmodium falciparum* indicating 18S Portion of Ribosomal RNA gene

Gel Electrophoresis. The amplified genes were subjected to electrophoresis in 2% Agarose stained with Ethidium bromide. The gel was allowed to run for 1 hour at 100 mA, after which the gel was visualized using an Ultraviolent (UV) Trans illuminator.

Determination of performance of Polymerase Chain Reaction and Microscopy. To determine the effectiveness of PCR and Microscopy in malaria diagnosis, its sensitivity, specificity, positive predictive value, negative predictive value and accuracy were calculated using the formulas.

$$Sensitivity = \frac{True\ positive}{True\ Positive\ +\ False\ Negative} \times 100, \quad (1)$$

$$Specificity = \frac{True\ Negative}{True\ Negative\ +\ False\ Positive} \times 100, \quad (1)$$

$$Positive\ Predictive\ value = \frac{True\ Positive}{True\ Positive\ +\ False\ Positive} \times 100, \quad (3)$$

$$Negative\ Predictive\ value = \frac{True\ Negative}{True\ Negative\ +\ False\ Negative} \times 100, \quad (4)$$

$$Overall\ accuracy = \frac{True\ positive\ +\ False\ Positive}{True_P + False_P + True_N + False_N} \times 100 \quad (5)$$

RESULTS AND DISCUSSION

Demographic and clinical information of the subjects. Table 1 below shows some essential demographic and clinical characteristics of the study subjects, where the age of the issues ranges from 5-50 years with a mean age of 28.60±10.60. The

mean ambient body temperature of the topics ranges from 33–43 °C with a mean of 37.77±1.92. For the molecular analysis, the concentration of the DNA sample extracted ranges from 100.10–600.2 ng/µl of the sample, and the mean concentration was 300.55±100.03. For purity, the mean value of A260/280 was 1.72±0.55, ranging from 0.7–5.11.

Table 1 – Demographic and Clinical characteristics of the study subject and essential elements of the DNA sample

Characteristics	Mean	Range	Male	Female
Age	28.60 ± 10.60	5–55 Years	114 / 57.0%	86 / 43.0%
Body Temperature	37.77 ± 1.92	33-43 °C		
DNA Concentration	300.57 ± 10.03	100.10-600.2 ng/l		
A260/280	1.72 ± 0.55	0.7–5.11		

Malaria Prevalence using Microscopy and Polymerase Chain Reaction. Of the two hundred blood sample samples analyzed by microscopy, 167(83.5%) was malaria positive. In contrast, a prevalence of 105(52.5%) was recorded when analyzed with Polymerase Chain Reaction, as shown in Figure 2. Statistically, the two techniques show no significant difference (×2= 0.787, df=1, P> 0.05).

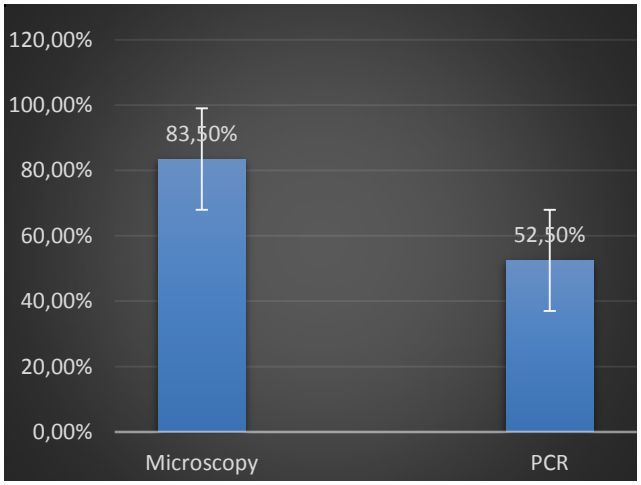


Figure 3 – Malaria prevalence using Microscopy and PCR

Results of Malaria diagnosis using PCR and Microscopy. Table 3 shows the diagnostic results of PCR and Microscopy. Out of the two hundred samples analyzed by both techniques, 90(45.0%) models were positive by both PCR and microscopy, hence true positive. In contrast, 77(38.5%) were negative with PCR but positive with microscopy. Therefore false negative. 15(7.5%) samples were positive with only PCR. Thus false positives and 18(9.0%) pieces were found to be harmful when tested using PCR and microscopy. Performance of Microscopy revealed that 15(7.5%) samples were found to be falsely negative, and 77(38.5%) and 18(9.0%) models were falsely positive and true negative, respectively.

Table 3 – Polymerase Chain Reaction and Microscopy results

Techniques		Positive	Negative	Total
PCR	Positive	90 (45.0%)	15 (7.5%)	105 (52.5%)
	Negative	77 (38.5%)	18 (9.0%)	95 (47.5%)
Total		167 (83.5%)	33 (16.5%)	200 (100%)
Microscopy	Positive	90 (45.0%)	77 (38.5%)	167 (83.5%)
	Negative	15 (7.5%)	18 (9.0%)	33 (16.5%)
Total		105 (53.0%)	95 (47.0%)	200 (100%)

Performance of PCR and Microscopy in malaria diagnosis. Therefore the overall performance of PCR to microscopy revealed sensitivity, specificity, positive predictive and negative predictive values of 53.89, 54.54, 85.71 and 18.94%, respectively, with an overall accuracy of 0.54. Microscopy revealed sensitivity and specificity values of 85.71 and 18.94%, respectively. In comparison, a positive predictive value of 53.89% and a negative predictive value of 54.54% were recorded, with 0.84 as the overall performance recorded in microscopy, as shown in Table 4.

Table 4 – Performance of PCR and Microscopy in falciparum-malaria diagnosis

Determinant	PCR, %	Microscopy, %
Sensitivity	53.89	85.71
Specificity	54.54	18.94
PPV	85.71	53.89
NPV	18.94	54.54
Accuracy	0.53	0.84.

Notes: PPV – Positive predictive value, NPV – Negative predictive value

One of the strategies to control malaria is the precise laboratory diagnosis to treat positive

cases appropriately [25], and it is one of the primary critical strategies for malaria eradication [26]. In addition, World Health Organisation has realized the importance and impact of novel techniques like PCR on malaria diagnosis regarding reliability and accuracy to overcome various disadvantages and other shortcomings that microscopy faces as the gold standard and other recommended diagnostic procedures [23]. The two diagnostic techniques (PCR and microscopy) used in this study revealed two different results: microscopy reported a very high malaria prevalence of 83.5% and 52.5% by PCR. The difference observed may be attributed to the fact that microscopy produced additional 62 positive samples over the 105 positive samples produced by PCR. However, PCR is more sensitive than microscopy as it can detect infection with parasites as low as 5 parasite/μL of blood sample [27]. The low sensitivity of PCR recorded in the present study might be attributed to other inherent factors of the technique, like the concentration of the parasites' DNA from which the 18srRNA gene was amplified from chromosome 13. This could lead to a decrease in the positive samples by the PCR as such affecting the sensitivity values of the PCR and other performance indices of the technique. In addition, microscopy is one of the most routine laboratory techniques [28] for diagnosing malaria infection in the study area [29]. Therefore, laboratory technologists have a mystery of the technique, which makes it difficult to be affected by either internal or external factors un noticed.

Contrary to the present study's findings, [4] reported almost the exact prevalence of 71.43% and 73.57% by microscopy and Polymerase chain reaction, respectively. This high prevalence reported by the two techniques in the present study is unsurprising. Instead, it only confirms the endemicity of the disease in the study area.

The performance of PCR reported in the present study in terms of sensitivity, specificity and negative predictive values is lower than that of [30], who reported high performance of PCR with 65.3%, 95.6% and 98.8% as sensitivity, specificity and negative predictive values respectively, but with the lower positive predictive value of 33.3% as compared to 85.71% reported in the present status. The sensitivity and specificity documented are also lower than 100% and 79%, respectively, written by [31]. The sensitivity value of 53.89% of PCR registered in this study indicated that PCR could detect 53.89% of the subjects suffering from malaria. The sensitivity of PCR reported in this study is far higher than the 12.63% reported by [32] from southeast Nigeria when Comparing the performance of different Malaria Diagnostic Tools, including PCR among Pregnant Cohorts in Onitsha Christian. At the same time, a 100% specificity value was recorded, which was higher than the 54.54% reported in the present study, which was several individuals free from malaria by PCR. In addition, the present study recorded 85.71% as a positive predictive value, corresponding to the number of subjects that tested positive and had malaria infection. On the other hand, a Negative Predictive Value of 18.94% reported in the present study indicated the number of subjects that tested negative and did not have malaria disease. Though the sensitivity and specificity of PCR recorded in this study are lower than 95% and 90%, respectively, recommended by World Health Organisation (6), the technique (PCR) was able to confirm almost 86% of subjects who have the disease condition (malaria).

Microscopy recorded a sensitivity value of 85.71% in the present study. This is similar to the findings of [33], who reported a sensitivity value of 89.4 but with higher specificity and positive and negative predictive values of 100% each. In addition, the findings from this study also contradict the results of [34], who reported higher sensitivity, specificity and Positive and Negative predictive values of 91.0%, 97.5%, 96.8% and 92.8%, respectively. Microscopy in the present study detected 83.5% of the individuals suffering from malaria infection and 18.94% free individuals. Nevertheless, 53.89% of the individuals tested positive and had malaria. In comparison, 54.54% of study subjects tested negative and did not have malaria infection like in PCR. Sensitivity and specificity values reported in the present study are lower than the recommended 95% and 90% for sensitivity and specificity, respectively.

The accuracy of the two techniques used in this study was 0.53 and 0.84, respectively, for PCR and Microscopy. These findings contradict the finding of [35], who reported a lower accuracy value of 0.42 and 0.4, respectively, for Microscopy and PCR.

CONCLUSIONS

Both PCR and microscopy have demonstrated a high level of sensitivity, and the specificity of PCR

is far higher than that of microscopy. Though the sensitivity and specificity recorded are lower than the World Health organizations' recommended values, the techniques can still provide the minimum required result. Both methods have demonstrated appreciable predictive values with an excellent level of accuracy.

Conflict of interest

The authors declare no conflict of interest.

REFERENCES

1. Edem, E. N., Mbong, E. O., & Hussain, S. (2020). Accuracy of Malaria Diagnosis by Microscopy and RDT Methods amongst Pregnant Women Attending Antenatal Clinic in Eket. *Journal Of Infectious Diseases and Diagnosis, 15*(3), 1–3.

2. Adeola, O., Oluyomi, S., Sola, A., Bassey, O., Oluwagbemiga, A., &Olusola, A. (2018). Performance of Microscopy Method and Rapid Diagnostic Tests in Malaria Diagnosis amongst Pregnant Women in Lagos, Southwest Nigeria. *Diversity and Equality in Health and Care, 15*(3), 104–109.

3. Yaya, S., Bishwajit, G., Ekholuenetale, M., Shah, V., Kadio, B., & Udenigwe, O. (2017). Knowledge of prevention, cause, symptom and practices of malaria among women in Burkina Faso. *PLOS ONE, 12*(7), e0180508. doi: 10.1371/journal.pone.0180508

4. Obimakinde, E. T., Simon-Oke I., & Osunyemi, O. S. (2018). The effectiveness of microscopy: Rapid diagnostic test and molecular assay in diagnosing malaria. *Journal of Parasitic Diseases: Diagnosis and Therapy, 3*(1). doi: 10.4066/2591-7846.1000022

5. Musbau, S., Bala, U., Umar, Y. D. (2014). Prevalence of Malaria Parasite Infection among Pregnant Women Attending General Sani Abacha Specialist Hospital Damaturu. *Scholars Journal of Applied Medical Sciences , 2*(6F), 3281–3283.

6. Muhammad, I., Abubakar, B., Mohammed, M. T., Abdullahi, A., & Asiya, M. (2022). Determination of malaria rapid diagnostic test effectiveness compared to microscopy (Gold standard). *DYSONA-Life Science, 3*, 49–56.

7. Sixpence, A., Nkoka, O., Chirwa, G. C., Milanzi, E. B., Mangani, C., Mathanga, D. P., & Ntenda, P. A. M. (2020). Levels of knowledge regarding malaria causes, symptoms, and prevention measures among Malawian women of reproductive age. *Malaria Journal, 19*(1). doi: 10.1186/s12936-020-03294-6

8. Mbanefo, A., & Kumar, N. (2020). Evaluation of Malaria Diagnostic Methods as a Key for Successful Control and Elimination Programs. *Tropical Medicine and Infectious Disease, 5*(2), 102. doi: 10.3390/tropicalmed5020102

9. DePina, A. J., Dia, A. K., de Ascenção Soares Martins, A., Ferreira, M. C., Moreira, A. L., Leal, S. V., Pires, C. M., Moreira, J. M. G., Tavares, M. F., da Moura, A. J. F., Pereira, J. M., Faye, O., Seck, I., & Niang, E. H. A. (2019). Knowledge, attitudes and practices about malaria in Cabo Verde: a country in the pre-elimination context. *BMC Public Health, 19*(1). doi: 10.1186/s12889-019-7130-5

10. Danwang, C., Noubiap, J. J., Souopgui, J., Gaudart, J., Yombi, J. C., & Robert, A. (2021). Accuracy of malaria diagnostic tests performed on non-invasively collected samples: a systematic review and meta-analysis. *BMJ Global Health, 6*(6), e005634. doi: 10.1136/bmjgh-2021-005634

11. Hathiwala, R., Mehta, P. R., Nataraj, G., & Hathiwala, S. (2017). LED fluorescence microscopy: Novel method for malaria diagnosis compared with routine methods. *Journal of Infection and Public Health, 10*(6), 824–828. doi: 10.1016/j.jiph.2017.01.001

12. Fransisca, L., Kusnanto, J. H., Satoto, T. B. T., Sebayang, B., Supriyanto, , Andriyan, E., & Bangs, M. J. (2015). Comparison of rapid diagnostic test Plasmotec Malaria-3, microscopy, and quantitative real-time PCR for diagnoses of Plasmodium falciparum and Plasmodium vivax infections in Mimika Regency, Papua, Indonesia. *Malaria Journal, 14*(1). doi: 10.1186/s12936-015-0615-5

13. Zaki, W., & Madkhali, A. (2016). Accuracy of immunochromatography diagnostic test versus microscopy in the diagnosis of malaria among clinically suspected patients in Jazan area, KSA. *Parasitologists United Journal, 9*(2), 95. doi: 10.4103/1687-7942.205164

14. Kitutu, F. E., Wamani, H., Selling, K. E., Katabazi, F. A., Kuteesa, R. B., Peterson, S., Kalyango, J. N., & Mårtensson, A. (2018). Can malaria rapid diagnostic tests by drug sellers under field conditions classify children 5 years old or less with or without Plasmodium falciparum malaria? *Comparison with nested PCR analysis. Malaria Journal, 17*(1). doi: 10.1186/s12936-018-2508-x

15. Badiane, A., Thwing, J., Williamson, J., Rogier, E., Diallo, M. A., & Ndiaye, D. (2022). Sensitivity and specificity for malaria classification of febrile persons by rapid diagnostic test, microscopy, parasite DNA, histidine-rich protein 2, and IgG: Dakar, Senegal 2015. *International Journal of Infectious Diseases, 121*, 92–97. doi: 10.1016/j.ijid.2022.04.060

16. Ricciardi, A., & Ndao, M. (2015). Diagnosis of Parasitic Infections: What's Going On? *SLAS Discovery, 20*(1), 6–21. doi: 10.1177/1087057114548065

17. Nijhuis, R. H. T., van Lieshout, L., Verweij, J. J., Claas, E. C. J., & Wessels, E. (2018). Multiplex real-time PCR for diagnosing malaria in a non-endemic setting: a prospective comparison to conventional methods. *European Journal of Clinical Microbiology & Infectious Diseases, 37*(12), 2323–2329. doi: 10.1007/s10096-018-3378-4

18. Gupta, P., Gupta, P., Rao, S., Singh, N., & Kalita, D. (2018). Comparison Between Microscopy And Rapid Diagnostic Tests In Diagnosis Of Malaria At A Tertiary Care Medical Institution In Uttarakhand (A 3-Year Study). *Asian Journal of Pharmaceutical and Clinical Research, 11*(2), 94. doi: 10.22159/ajpcr.2018.v11i2.22141

19. Oboh, M. A., Oriero, E. C., Ndiaye, T., Badiane, A. S., Ndiaye, D., & Amambua-Ngwa, A. (2021). Comparative analysis of four malaria diagnostic tools and implications for malaria treatment in southwestern Nigeria. *International Journal of Infectious Diseases, 108*, 377–381. doi: 10.1016/j.ijid.2021.05.049

20. Richardson, D. C., Ciach, M., Zhong, K. J. Y., Crandall, I., & Kain, K. C. (2002). Evaluation of the Makromed Dipstick Assay versus PCR for Diagnosis of Plasmodium falciparum Malaria in Returned Travelers. *Journal of Clinical Microbiology, 40*(12), 4528–4530. doi: 10.1128/jcm.40.12.4528-4530.2002

21. Nair, C. B., Manjula, J., Subramani, P. A., Nagendrappa, P. B., Manoj, M. N., Malpani, S., Pullela, P. K., Subbarao, P. V., Ramamoorthy, S., & Ghosh, S. K. (2016). Differential Diagnosis of Malaria on Truelab Uno®, a Portable, Real-Time, MicroPCR Device for Point-Of-Care Applications. *PLOS ONE, 11*(1), e0146961. doi: 10.1371/journal.pone.0146961

22. Siwal, N., Singh, U. S., Dash, M., Kar, S., Rani, S., Rawal, C., Singh, R., Anvikar, A. R., Pande, V., & Das, A. (2018). Malaria diagnosis by PCR revealed differential distribution of mono and mixed species infections by Plasmodium falciparum and P. vivax in India. *PLOS ONE, 13*(3), e0193046. doi: 10.1371/journal.pone.0193046

23. Wardhani, P., Butarbutar, T. V., Adiatmaja, C. O., Betaubun, A. M., Hamidah, N., & Aryati. (2020). Performance Comparison of Two Malaria Rapid Diagnostic Test with Real Time Polymerase Chain Reaction and Gold Standard of Microscopy Detection Method. *Infectious Disease Reports, 12*(11), 8731. doi: 10.4081/idr.2020.8731

24. Londono, B. L., Eisele, T. P., Keating, J., Bennett, A., Chattopadhyay, C., Heyliger, G., Mack, B., Rawson, I., Vely, J.-F., Désinor, O., & Krogstad, D. J. (2009). Chloroquine-Resistant HaplotypePlasmodium falciparumParasites, Haiti. *Emerging Infectious Diseases, 15*(5), 735–740. doi: 10.3201/eid1505.081063

25. Hernandez-Valladares, M., Rihet, P., & Iraqi, F. A. (2014). Host susceptibility to malaria in human and mice: compatible approaches to identify potential resistant genes. *Physiological Genomics, 46*(1), 1–16. doi: 10.1152/physiolgenomics.00044.2013

26. Rifaie-Graham, O., Pollard, J., Raccio, S., Balog, S., Rusch, S., Hernández-Castañeda, M. A., Mantel, P.-Y., Beck, H.-P., & Bruns, N. (2019). Hemozoin-catalyzed precipitation polymerization as an assay for malaria diagnosis. *Nature Communications, 10*(1). doi: 10.1038/s41467-019-09122-z

27. Rodulfo, H., De Donato, M., Mora, R., González, L., & Contreras, C. E. (2007). Comparison of the diagnosis of malaria by microscopy, immunochromatography and PCR in endemic areas of Venezuela. *Brazilian Journal of Medical and Biological Research, 40*(4), 535–543. doi: 10.1590/s0100-879x2007000400012

28. Wilson, M. L. (2013). Laboratory Diagnosis of Malaria: Conventional and Rapid Diagnostic Methods. *Archives of Pathology & Laboratory Medicine, 137*(6), 805–811. doi: 10.5858/arpa.2011-0602-ra

29. Efunshile, M., Amoo, A. O. J., Akintunde, G. B., Ojelekan, O. D., König, W., & König, B. (2011). Use and Effects of Malaria Control Measures in Pregnancy in Lagos, Nigeria. *The Korean Journal of Parasitology, 49*(4), 365. doi: 10.3347/kjp.2011.49.4.365

30. Masanja, I. M., McMorrow, M. L., Maganga, M. B., Sumari, D., Udhayakumar, V., McElroy, P. D., Kachur, S. P., & Lucchi, N. W. (2015). Quality assurance of malaria rapid diagnostic tests used for routine patient care in rural Tanzania: microscopy versus real-time polymerase chain reaction. *Malaria Journal, 14*(1). doi: 10.1186/s12936-015-0597-3

31. Wangai, L., Karau, M., Njiruh, P., Sabah, O., Kimani, F., Magoma, G., & Kiambo, N. (2011). Sensitivity of microscopy compared to molecular diagnosis of P. falciparum: Implications on malaria treatment in epidemic areas in Kenya. *African Journal of Infectious Diseases, 5*(1). doi: 10.4314/ajid.v5i1.66504

32. Uba, C. C., Ikegbunam, M. N., Anagor, I. S., Eleanya, L. C., Ezeumeh, E. N., Ezekwueche, S. N., Okechukwu, E. C., & Esimone, C. O. (2021). Comparative Performance of Different Malaria Diagnostic Tools among Pregnant Cohorts in Onitsha Southeast Nigeria. *Advances in Infectious Diseases, 11*(04), 384–394. doi: 10.4236/aid.2021.114035

33. Khan, S. A., Ahmed, S., Mushahid, N., Anwer, M., Saeed, S., Khan, F. A., Shamshad, G. U., & Joyia, Z. (2013). Comparison of real time polymerase chain reaction with microscopy and antigen detection assay for the diagnosis of malaria. *Journal of the College of Physicians and Surgeons--Pakistan: JCPSP*, *23*(10), 787–792.

34. Adiatmaja, C. O., Butarbutar, T. V., Betaubun, A. M., & Wardhani. P. (2020). Comparison of Malaria Microscopy and Polymerase Chain Reaction for Identification of Plasmodium in Papua, Indonesia. *Systematic Reviews in Pharmacy, 11*(06). doi: 10.31838/srp.2020.6.16

35. Shankar, H., Singh, M. P., Phookan, S., Singh, K., & Mishra, N. (2021). Diagnostic performance of rapid diagnostic test, light microscopy and polymerase chain reaction during mass survey conducted in low and high malaria-endemic areas from two North-Eastern states of India. *Parasitology Research, 120*(6), 2251–2261. doi: 10.1007/s00436-021-07125-8

Огляд особливостей соціального навчання представників роду Corvus

Overview of the Peculiarities of Social Learning of Representatives of the Genus Corvus

Оксана Пальчик [1]
Oksana Palchyk

[1] *Kharkiv Humanitarian-Pedagogical Academy*
7 Rustaveli Lane, Kharkiv, 61050, Ukraine

DOI: 10.22178/pos.89-26

LCC Subject Category: QH301-705.5

Received 28.12.2022
Accepted 29.01.2023
Published online 31.01.2023

Corresponding Author: oksanapalchik@ukr.net

© 2023 The Author. This article is licensed under a Creative Commons Attribution 4.0 License

Анотація. В даній статті навчання розглядається як одна з форм нормального функціонування соціальної групи. Проведено аналіз та узагальнення сучасних літературних публікацій стосовно особливостей соціального навчання представників роду Corvus.

В ході аналізу сучасної наукової літератури встановлено, що соціальний досвід у ранньому віці суттєво впливає на розвиток моделей соціальної взаємодії, на які крім батьків впливає взаємозв'язок з однолітками. Серед однолітків саме брати і сестри мають високий ступінь толерантності та соціально-позитивної поведінки. Вплив соціального контексту залежить також від поєднання птахів за статтю «самець-самець» та «самець-самка». Соціальна коаліція «самка-самка» рідкісне явище серед воронових, але є докази такої взаємодії, тому його можна виділити як перспективний напрямок досліджень. Більшість проаналізованих джерел свідчать про те, що родинні зв'язки підвищують продуктивність воронів щодо соціального навчання як в родинних так і в міжродинних групах.

Підкреслено, що соціально-когнітивна поведінка представників роду Corvus обумовлена існуванням нейронних механізмів пам'яті. Нейронні мережі можуть брати участь в інтеграції індивідуальної дискримінації та контролю соціальної поведінки в домінуванні на основі пам'яті у воронових. Стать і агресивність є визначальними як індивідуальні характеристики для формування домінування. Домінування пояснює індивідуальні відмінності у реакціях на тривогу, які мають соціальний контекст.

Соціальне навчання деяких представників роду Corvus яскраво виражена у здатності підтримувати культурні варіації вокалізації всередині популяції та виготовленні інструментів для добування їжі. Зроблено припущення, що основні моделі дій для використання інструментів можуть мати своє еволюційне походження в запасанні їжі (кешуванні). Індивідуальне навчання методом проб і помилок розглядається як складова соціального навчання всередині родинних груп та між групами.

Ключові слова: соціальне навчання; соціальна поведінка; родинні зв'язки; пам'ять; домінування; інструменти; вокалізація.

Abstract. This article considers learning as one of the forms of the normal functioning of a social group. The article analyses and summarises modern literary publications on the peculiarities of social learning of representatives of the genus Corvus.

In the course of the analysis of modern scientific literature, it is found that social experience at an early age significantly affects the development of models of social interaction, which, in addition to parents, are influenced by the relationship with peers. Among peers, siblings have a high tolerance and socially positive behaviour. The influence of the social context also depends on the combination of male-male and

male-female sexes. The female-female social coalition is a rare phenomenon among ravens, but there is evidence of such interaction, so that it can be identified as a promising area of research. Most of the analysed sources indicate that kinship ties increase the productivity of crows in terms of social learning in kin and interfamilial groups.

It is emphasised that the social and cognitive behaviour of representatives of the genus Corvus is due to the existence of neural memory mechanisms. Neural networks may integrate individual discrimination and control of social behaviour in memory-based dominance in ravens. Sex and aggressiveness are crucial as personal characteristics for dominance formation. Distinction explains individual differences in anxiety responses that have a social context.

The social learning of some members of the genus Corvus is clearly expressed in the ability to maintain cultural variations in vocalisation within the population and manufacturing tools for food production. The basic models of actions for using tools may have their evolutionary origin in food storage (caching). Individual learning by trial and error is considered a social learning component within kinship and between groups.

Keywords: social learning; social behavior; kinship; memory; dominance; tools; vocalisation.

ВСТУП

У більшості тварин поведінка пов'язана з навчанням. Севериновська О. В. зі співавторами розглядає навчання як адаптивну зміну індивідуальної поведінки у результаті попереднього досвіду, відмічаючи, що навчання є модифікацією поведінки, яка виникає у результаті індивідуального досвіду особини, а не є наслідком зростання, дозрівання, старіння організму або наслідком стомлення. У результаті навчання в поведінці тварин відбуваються суттєві зміни, які зберігаються назавжди, хоча вивчена поведінка може згаснути або гальмуватися, але тварина ніколи не повернеться до свого колишнього стану [19].

Питання про навчання, залежно від бажаного акценту, можна розглядати у різних контекстах: у чисто описовому плані, як критичний аспект розвитку, як механізм регуляції поведінки, як продукт еволюційної історії або як адаптацію. В даній статті навчання розглядається як одна з форм нормального функціонування соціальних груп, на прикладі птахів родини Corvidae.

Мета статті – аналіз та узагальнення сучасних зарубіжних літературних публікацій стосовно особливостей соціального навчання представників роду Corvus.

РЕЗУЛЬТАТИ ДОСЛІДЖЕННЯ

В статті аналізуються особливості соціального навчання таких представників роду Corvus як крук або ворон *Corvus corax* (Linnaeus, 1758), якому присвячена найбільша частина дослідницьких робіт по соціальному навчанню, ворона великодзьоба *Corvus macrorhynchos* (Wagler, 1827), гавайська ворона *Corvus hawaiiensis* (Peale, 1848), ворона новокаледонська *Corvus moneduloides* (Lesson, 1831), ворона чорна *Corvus corone* (Linnaeus, 1758), грач *Corvus frugilegus* (Linnaeus, 1758).

Представники роду Corvus це моногамні види, відомі своїми особливими соціально-когнітивними навичками та складними соціальними відносинами. В останні роки велика кількість досліджень стосувалась ранніх етапів розвитку цих птахів, а саме від народження, вильоту з гнізда і до початку періоду розмноження. Саме в цей період птахи живуть у родинних групах, в яких соціальні відносини мають особливе значення.

Соціальне навчання полегшує прийняття обґрунтованих рішень щодо пошуку їжі, паруванння та тактики боротьби з хижаками серед тварин [17].

Спостереження за пташенятами *C. corax* в період вильоту з гнізда дозволив встановити утворення і міцність соціальних зв'язків між членами родинних груп. Доведено, що між братами і сестрами, партнерами, які зустрічалися в ранньому віці, між різностатевими партнерами та партнерами чоловічої статі формуються соціальні зв'язки однакової сили. З'ясовано, що ворони, позбавлені батьків-

ського піклування, порівняно з птахами, вихованими батьками, показали зв'язаність з більшою кількістю членів соціальної групи, але ці зв'язки виявились менш міцними. Це доводить, що соціальний досвід у ранньому віці суттєво впливає на розвиток моделей соціальної взаємодії. Позбавлення батьківського піклування та присутність одноліток в період навчання пташенят літати, максимізує схильність воронів взаємодіяти всередині соціальної групи, вказуючи на те, що окрім батьків, взаємодія з однолітками має суттєве значення [4].

Дослідження розвитку домінування та афіліативних відносин серед воронів *C. corax*, вихованих у неволі, дозволило встановити, що брати і сестри мають більший ступінь толерантності та більшу соціально-позитивну поведінку. Втручання в чужі конфлікти характеризується переважною підтримкою родичів та близьких соціальних партнерів. Ці результати показують, що ворони формують стабільні стосунки вже на першому році життя [12].

У дослідженнях, в яких експериментально маніпулювали виводком 13 сімей воронів *C. corax*, створювали малі або великі родини, птахів першого року життя відокремлювали від батьків і тимчасово поміщали в одну з двох невільних груп. Після п'яти тижнів експерименту кожен ворон був окремо протестований у трьох соціальних категоріях: рідні брати і сестри, знайомі неспоріднені ворони та незнайомі неспоріднені ворони з іншого вольєру. Тестування виявило збереження родинних зв'язків в першій групі та високого впізнавання у другій. Було встановлено, що птахи, які виховувалися в невеликих сім'ях, були більш уважними, ніж птахи з великих сімей, зокрема, до знайомих неспоріднених одноліток. Ці результати підтверджують важливість взаємодії з однолітками в середині соціальної групи [7].

Цікавими виявляються дослідження впливу соціальних відносин на соціальну фасилітацію під час підходу до нових об'єктів. Було протестовано реакцію 11 воронів C. corax, вирощених у вольєрах без батьківського піклування, на нові об'єкти окремо у віці трьох і шести місяців і в діадичних комбінаціях у віці шести місяців. Птахи приєднувалися до братів і сестер швидше, щоб наблизитися до нових об'єктів, ніж до інших. Вони також проводили більше часу, сидячи поруч із братами та сестрами. У діадах самець-самець, підлеглі особини наближалися до нових об'єктів значно швидше, ніж домінантні птахи. Навпаки, домінантні самці були першими, хто наближався до нових об'єктів у змішаних статевих комбінаціях. Отже, вплив соціального контексту залежить від соціальних стосунків із однолітками та від поєднання птахів за статтю [22].

В ході дослідження афілійованих відносин між родичами *C. corax* було доведено, що родинні зв'язки підвищують продуктивність воронів щодо соціального навчання. Спостереження за соціальною динамікою в групі молодих воронів показали, що брати і сестри проводили значно більше часу в безпосередній близькості один від одного, ніж з неспорідненими особинами. Експеримент на посилення стимулу в діадах модель-спостерігач, дозволив констатувати, що спостерігачі з діад братів і сестер обробляли цільовий об'єкт протягом значно довшого періоду часу порівняно з іншими доступними об'єктами. Крім того, брати й сестри відповідали рішенням моделі ховати або не ховати об'єкти значно частіше, ніж інші. Отже, результати підтверджують, що партнерські стосунки між індивідами як в родинних так і міжродинних групах впливають на передачу інформації та можуть призвести до спрямованого соціального навчання [18].

Відомо, що *C. corax* є неофобним видом. У наукових працях ряду авторів стверджується, що неофобія може стримувати пошукову поведінку, навчання та інновації, тоді як соціальний контекст може його посилювати. Ворони *C. corax*, *C. corone* є зручними об'єктами для вивчення впливу соціального контексту, оскільки вони є дуже неофобними тваринами, які вербують конспецифів для пошуку їжі. В ході дослідження було встановлено, що поодинокі птахи швидше наближалися до нових об'єктів, ніж під час тестування з однолітками. Але вони проводили більше часу поряд з новим об'єктом в соціальних умовах (діадичних і групових), ніж коли були наодинці [6; 21].

Додаткове підтвердження значущості соціальної складової в популяціях воронових можна знайти в експерименті, в ході якого проводились дослідження взаємозалежності між поведінковим фенотипом і реакцією на соці-

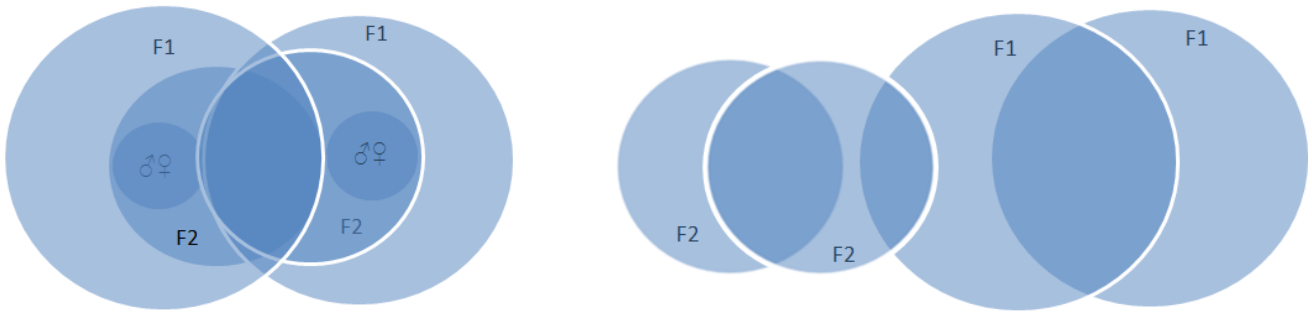
альний контекст під час появи нового об'єкта. Було визначено особин як «швидких» і «повільних» дослідників на основі їх затримки наближення до нових об'єктів під час індивідуального тестування. Було з'ясовано, що наявність конспецифіків затримувала наближення швидких птахів до нових об'єктів. Повільні птахи, навпаки, наближалися до нових об'єктів скоріше та проводили більше часу поряд з ними, коли були в діаді зі швидкими братами та сестрами, ніж коли були поодинці [20]. Автори дослідження здатності до навчання та поведінкової гнучкості ворон *C. corone*, також наголошують на необхідності враховувати поведінкові фенотипи особин одного виду під час дослідження когнітивних навичок [24].

Варто відмітити спостереження за пташенятами великодзьобої ворони *C. macrorhynchos*. Спостерігали формування позитивних контактів між пташенятами з різних сімей під час гри. В даній науковій роботі стверджується, що така особливість поведінки пташенят відіграє важливу роль у включенні молоді в соціальну структуру популяції [15].

Граки *C. frugilegus* живуть у добре інтегрованому соціальному суспільстві, виходячи далеко за межі унікального моногамного парного зв'язку. Граки переважно взаємодіють з парними родичами і з особинами, пов'язаними з їх соціальним партнером (тобто «друзі друзів» або тріадичне замикання) [5].

Результати дослідження [16] не підтвердили прямого зв'язку між віком і здібностями до соціального навчання ворон. Проте встановили, що фактори життєвого циклу, опосередковано пов'язані з віком (вік першого розмноження та система розселення), впливають на схильність до соціального навчання. Ними встановлено, що успішність соціального навчання корелює з факторами, пов'язаними з самим експериментом (тварини, вирощені в неволі чи дикі; тип завдання, що використовується для оцінки соціального навчання).

Узагальнення результатів наукових досліджень, які були нами проаналізовані, доцільно представити у вигляді схеми (рисунок 1), яка демонструє особливості соціальної взаємодії особин в родинних групах воронів дикого типу та вирощених в неволі.



А Б

Рисунок 1 – Моделі соціальної взаємодії:
А – родинні групи з батьківським піклуванням (міцні родинні зв'язки); Б – родинні групи птахів, вирощених в неволі (соціальні зв'язки нестійкі)

В жодному з джерел, які аналізувались вище, не було виявлено соціальної взаємодії «самка-самка».

Але в науковій праці [9] описано коаліційну агресивну поведінку в групі самок, що складається з вербування, скоординованої погоні та нападу. Самка найвищого соціального рангу кілька разів підтримувала зв'язок із другою за домінантністю самкою, щоб брати участь у скоординованій погоні та нападі на ворону нижчого рангу. Незважаючи на активне втручання третьої за рангом особини, напад зрештою призвів до смерті жертви. Усі особини не належали до спільної родинної групи та були жіночої статі. Було зроблено припущення, що коаліція самок може відображати стратегію домінуючого індивіда для забезпечення довгострокових соціальних вигод. Загалом дослідження надає докази того, що представники сімейства воронових беруть участь у скоординованих альянсах,

спрямованих проти однорідних, як можливий спосіб маніпулювання своїм соціальним середовищем.

Отже, соціальний досвід у ранньому віці суттєво впливає на розвиток моделей соціальної взаємодії. Вплив соціального контексту залежить від соціальних стосунків із однолітками та від поєднання птахів за статтю «самець-самець» та «самець-самка». Соціальна коаліція «самка-самка» рідкісне явище серед воронових, але наявні докази такої взаємодії, дозволяють виділити його як перспективний напрямок подальших досліджень.

Соціально-когнітивна поведінка тварин передбачає існування нейронних механізмів інтеграції, а саме соціалізації та індивідуальної дискримінації, яка характерна для представників родини Corvidae. Ворони *C. macrorhynchos* це соціальні птахи, які формують стабільні відносини домінування, засновані на пам'яті про результат перших зустрічей та на індивідуальній дискримінації. З'ясування нейронних механізмів домінування пам'яті у *C. macrorhynchos* довело локалізацію нейронних корелятів агресивної та підкореної поведінки, а також корелятів з фактором знайомства в лімбічному субпалліумі, а кореляти соціальної поведінки – в паліумі та гіпокампі. Враховуючи анатомічний зв'язок і моделі нейронної реакції фокальних ядер, нейронні мережі, що з'єднують палліум і лімбічний субпалліум через гіпокамп, можуть брати участь в інтеграції індивідуальної дискримінації та контролю соціальної поведінки в домінуванні на основі пам'яті у воронових [14].

Досліджуючи домінування в популяції *C. macrorhynchos* виявилося, що стать і агресивність були визначальними як індивідуальні характеристики для формування домінування. Самці домінують над самками, а більш агресивні особини – над менш агресивними. Агресивні взаємодії в діадах відбуваються в основному під час першої зустрічі та різко зменшуються під час наступних зустрічей. Ці результати свідчать про те, що для воронових характерна лінійна форма домінування, яка визначається статтю та агресивністю, яка підтримується зовнішньо спогадами про минулі результати, пов'язані з конкретними особами, що передбачає індивідуальне запам'ятовування [10].

Унікальні властивості памяті представників воронових виявлені під час кільцювання птахів. Дикі американські ворони видавали сигнали тривоги особам із спеціальною маскою протягом 2,7 років після того, як ті люди спіймали та закільцювали їх.

В іншому дослідженні з *C. corax* експериментатори носили два типи масок, проходячи повз два вольєри з воронами. У чотирьох тренувальних випробуваннях «небезпечну» маску демонстрували з мертвим круком, тоді як «нейтральну» маску демонстрували з порожніми руками. Між кожним навчальним випробуванням і в усіх наступних випробуваннях демонстрували обидва типи масок без мертвих ворон. Ворони швидко навчалися (часто на основі першого випробування), і деякі особини протягом наступних 4 років відрізняли небезпечну маску від нейтральної. Незважаючи на однакову кількість і якість впливу небезпечної маски, були виявлені яскраво виражені індивідуальні відмінності у сигналах тривоги, які були досить послідовними в тестових випробуваннях у соціально стабільних ситуаціях. Встановлено, що домінування, а не стать, пояснює індивідуальні відмінності у реакціях на тривогу. Зміни в інтенсивність сигналу тривоги корелювали зі змінами в складі групи та формуванні пар, що ще більше підкреслює соціальний контекст сигналів тривоги воронів [3].

Дослідження здатності до соціального навчання островних популяцій новокаледонської ворони *C. moneduloides* показали, що цей вид демонструє значні великомасштабні варіації вокалізації. Це є переконливим доказом існування у цих птахів соціального навчання вокалізації. Цей вид демонструє достатні механізми соціального навчання та структурування всередині популяції, щоб генерувати та підтримувати культурні варіації вокалізації всередині популяції. Це може бути притаманно в інших формах поведінки, включаючи виготовлення та використання інструментів [2]. Інструмент – це виготовлений функціональний предмет. Використання знарядь можна визначити «використанням зовнішнього об'єкта як функціонального продовження дзьоба, кігтя, що розширює фізичний вплив тварини на досягнення мети».

Новокаледонські ворони *C. moneduloides* виробляють палиці, гачки та ступінчасті інструменти з листя пандануса. Вони

використовують їх, щоб витягнути жуків *Cerambycidae* (Latreille, 1802) з мертвої деревини дерева *Aleutirites moluccanus* (L.) Willd, 1805). Доведено, що ворони створюють інструменти з фізичних матеріалів саме для пошуку їжі [13].

Доведено, що гавайська ворона *C. hawaiiensis* також використовує інструменти. На жаль, гавайська ворона вимерла в дикій природі. Світова популяція підтримується у двох розплідниках у надії, що вони з часом зможуть повернутися в дику природу [23].

З метою глибшого розуміння еволюції використання інструментів проводились дослідження щодо порівняння розвитку маніпуляцій з предметами у ворон *C. moneduloides* та звичайних круків *C. corax*, які не використовують інструменти регулярно. Виявлена вражаюча якісна подібність в онтогенезі орієнтованої на знаряддя праці поведінки новокаледонських ворон і поведінки, пов'язаної із запасанням їжі у ворон *C. corax*. Зроблено припущення, що основні моделі дій для використання знарядь новокаледонськими воронами можуть мати своє еволюційне походження в запасанні їжі (кешуванні) [11].

Зростаюча кількість спостережень та експериментальних даних демонструє, що різні види тварин здатні набувати форми поведінки використання інструментів за допомогою індивідуального навчання, причому соціальне навчання (не копіювання) регулює частоту форм поведінки всередині і, опосередковано, між групами [1]. Це підтверджують дослідження популяцій грачів *C. frugilegus* та новокаледонських ворон *C. Moneduloides*, в яких надано переконливі докази навчання методом проб і помилок під час виконання завдань з кількісною перевагою здійснюваних проб, тобто підкреслюється значущість індивідуального навчання [8].

ВИСНОВКИ

Отже, в ході аналізу сучасних літературних джерел встановлено, що соціальний досвід у ранньому віці суттєво впливає на розвиток моделей соціальної взаємодії, на які крім батьків впливає взаємозв'язок з однолітками. Серед однолітків саме брати і сестри мають високий ступінь толерантності та соціально-позитивної поведінки. Вплив соціального контексту залежить також від поєднання птахів за статтю «самець-самець» та «самець-самка». Соціальна коаліція «самка-самка» рідкісне явище серед воронових, але є докази такої взаємодії, тому його можна виділити як перспективний напрямок досліджень. Більшість проаналізованих джерел свідчать про те, що родинні зв'язки підвищують продуктивність воронів щодо соціального навчання як в родинних так і в міжродинних групах.

Підкреслено, що соціально-когнітивна поведінка представників роду Corvus обумовлена існуванням нейронних механізмів пам'яті. Нейронні мережі можуть брати участь в інтеграції індивідуальної дискримінації та контролю соціальної поведінки в домінуванні на основі пам'яті у воронових. Стать і агресивність є визначальними як індивідуальні характеристики для формування домінування. Домінування пояснює індивідуальні відмінності у реакціях на тривогу, які мають соціальний контекст.

Соціальне навчання деяких представників роду Corvus яскраво виражена у здатності підтримувати культурні варіації вокалізації всередині популяції та виготовленні інструментів з метою пошуку їжі. Зроблено припущення, що основні моделі дій для використання інструментів можуть мати своє еволюційне походження в запасанні їжі (кешуванні). Індивідуальне навчання методом проб і помилок розглядається як складова соціального навчання всередині родинних груп та між групами.

СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ / REFERENCES

1. Bandini, E., & Tennie, C. (2020). Exploring the role of individual learning in animal tool-use. *PeerJ, 8*, e9877. doi: 10.7717/peerj.9877

2. Bluff, L. A., Kacelnik, A., & Rutz, C. (2010). Vocal culture in New Caledonian crows Corvus moneduloides. *Biological Journal of the Linnean Society, 101*(4), 767–776. doi: 10.1111/j.1095-8312.2010.01527.x

3. Blum, C. R., Fitch, W. T., & Bugnyar, T. (2020). Rapid Learning and Long-Term Memory for Dangerous Humans in Ravens (Corvus corax). *Frontiers in Psychology, 11*. doi: 10.3389/fpsyg.2020.581794

4. Boucherie, P. H., Blum, C., & Bugnyar, T. (2020). Effect of rearing style on the development of social behaviour in young ravens (Corvus corax). *Ethology, 126*(6), 595–609. doi: 10.1111/eth.13010

5. Boucherie, P. H., Sosa, S., Pasquaretta, C., & Dufour, V. (2016). A longitudinal network analysis of social dynamics in rookscorvus frugilegus: repeated group modifications do not affect social network in captive rooks. *Current Zoology, zow083*. doi: 10.1093/cz/zow083

6. Federspiel, I. G., Schmitt, V., Schuster, R., Rockenbach, C., Braun, A., Loretto, M.-C., Michels, C., Fischer, J., Mussweiler, T., & Bugnyar, T. (2023). *Are You Better Than Me? Social Comparisons in Carrion Crows (Corvus corone)*. doi: 10.21203/rs.3.rs-2500378/v1

7. Gallego-Abenza, M., Boucherie, P. H., & Bugnyar, T. (2022). Early social environment affects attention to social cues in juvenile common ravens, Corvus corax. *Royal Society Open Science, 9*(6). doi: 10.1098/rsos.220132

8. Ghirlanda, S., & Lind, J. (2017). 'Aesop's fable' experiments demonstrate trial-and-error learning in birds, but no causal understanding. *Animal Behaviour, 123*, 239–247. doi: 10.1016/j.anbehav.2016.10.029

9. Holtmann, B., Buskas, J., Steele, M., Sokolovskis, K., & Wolf, J. B. W. (2019). Dominance relationships and coalitionary aggression against conspecifics in female carrion crows. *Scientific Reports, 9*(1). doi: 10.1038/s41598-019-52177-7

10. Izawa, E.-I., & Watanabe, S. (2008). Formation of linear dominance relationship in captive jungle crows (Corvus macrorhynchos): Implications for individual recognition. *Behavioural Processes, 78*(1), 44–52. doi: 10.1016/j.beproc.2007.12.010

11. Kenward, B., Schloegl, C., Rutz, C., Weir, A. A. S., Bugnyar, T., & Kacelnik, A. (2011). On the evolutionary and ontogenetic origins of tool-oriented behaviour in New Caledonian crows (Corvus moneduloides). *Biological Journal of the Linnean Society, 102*(4), 870–877. doi: 10.1111/j.1095-8312.2011.01613.x

12. Loretto, M. C., Fraser, O. N., & Bugnyar, T. (2012). Ontogeny of Social Relations and Coalition Formation in Common Ravens (*Corvus corax*). *International journal of comparative psychology*, *25*(3), 180–194.

13. McCarthy, W. (2022). Something to Crow About: Birds with Tools. *Concept. Phychology, 45*.

14. Nishizawa, K., Izawa, E.-I., & Watanabe, S. (2011). Neural-activity mapping of memory-based dominance in the crow: neural networks integrating individual discrimination and social behaviour control. *Neuroscience, 197*, 307–319. doi: 10.1016/j.neuroscience.2011.09.001

15. Obozova, T. A., Smirnova, A. A., & Zorina, Z. A. (2018). Early Ontogeny of the Behavior of Young in Large-Billed Crows (Corvus macrorhynchos) in Their Natural Habitat. *Biology Bulletin, 45*(8), 794–802. doi: 10.1134/s1062359018080125

16. Penndorf, J., & Aplin, L. (2020). Environmental and life history factors, but not age, influence social learning about food: a meta-analysis. *Animal Behaviour, 167*, 161–176. doi: 10.1016/j.anbehav.2020.07.001

17. Roy, T., & Bhat, A. (2017). Social learning in a maze? Contrasting individual performance among wild zebrafish when associated with trained and naïve conspecifics. *Behavioural Processes, 144*, 51–57. doi: 10.1016/j.beproc.2017.09.004

18. Schwab, C., Bugnyar, T., Schloegl, C., & Kotrschal, K. (2008). Enhanced social learning between siblings in common ravens, Corvus corax. *Animal Behaviour, 75*(2), 501–508. doi: 10.1016/j.anbehav.2007.06.006

19. Severynovska, O., Pakhomov, O., & Rybalchenko, V. (2010). *Etolohiia (osnovy povedinky tvaryn)* [Ethology (basics of animal behaviour)]. Dnipro: Vydavnytstvo dnipropetrovskoho natsionalnoho universytetu (in Ukrainian).

20. Stöwe, M., & Kotrschal, K. (2007). Behavioural phenotypes may determine whether social context facilitates or delays novel object exploration in ravens (Corvus corax). *Journal of Ornithology, 148*(S2), 179–184. doi: 10.1007/s10336-007-0145-1

21. Stöwe, M., Bugnyar, T., Heinrich, B., & Kotrschal, K. (2006). Effects of Group Size on Approach to Novel Objects in Ravens (Corvus corax). *Ethology, 112*(11), 1079–1088. doi: 10.1111/j.1439-0310.2006.01273.x

22. Stöwe, M., Bugnyar, T., Loretto, M.-C., Schloegl, C., Range, F., & Kotrschal, K. (2006). Novel object exploration in ravens (Corvus corax): Effects of social relationships. *Behavioural Processes, 73*(1), 68–75. doi: 10.1016/j.beproc.2006.03.015

23. Uomini, N., & Hunt, G. (2017). A new tool-using bird to crow about. *Learning & Behavior, 45*(3), 205–206. doi: 10.3758/s13420-017-0262-5

24. Wascher, C. A. F., Allen, K., & Szipl, G. (2021). Learning and motor inhibitory control in crows and domestic chickens. *Royal Society Open Science, 8*(10). doi: 10.1098/rsos.210504

Determination of Gold Nanoparticle Sizes from Their Plasmon Resonance within the Optical Spectrum

John M. Gitonga [1], **Simon W. Mugo** [1], **James M. Ngaruiya** [1]

[1] *Jomo Kenyatta University of Agriculture and Technology*
P. O. Box 62 000 – 00200 Nairobi, Kenya

DOI: 10.22178/pos.89-23

LCC Subject Category: QC1-999

Received 16.12.2022
Accepted 28.01.2023
Published online 31.01.2023

Corresponding Author:
John M. Gitonga
mbaejoni@gmail.com

© 2023 The Authors. This article is licensed under a Creative Commons Attribution 4.0 License

Abstract. Nanoparticles have exciting properties that can be tailored by altering their size, density and shape. Several essential properties of the nanoparticles have been investigated for various applications. One such property strongly affected by the nanoparticle size is localised surface plasmon resonance (LSPR). The resonance from metal nanoparticles has been used in dye-sensitised solar cells to improve their performance. In this work, the dependence of plasmonic properties on the nanoparticle sizes is shown. The gold nanoparticles were prepared using a reduction process where the hydrogen tetrachloroaurate acid was used as the base gold salt and reduced by sodium citrate composed at different molarity ranging from 0.015 to 0.035 mol/L. The method produces monodispersed nanoparticles whose sizes are sensitive to the concentration of chemicals used and the completeness of the reduction process. The process took approximately 18 minutes, and the colour changed from pale yellow to wine red. The absorbance of resulting gold nanoparticles was determined using a UV Vis spectrophotometer within 300 nm to 800 nm. The LSPR peaks were found to occur within 518 nm to 520 nm, and from a Gaussian fit, the FWHM ranged from 45.5 to 51.0 nm. The absorption peaks had a narrow range of 14 nm over sodium citrate's molarity content. A high molarity concentration of 0.035 mol/L produced a small particle with a diameter of 17 nm, while a low concentration of 0.015 mol/L produced a size of 26 nm. The interaction of electrons in the specific orbitals, sp- and d- of nanoparticles exhibited pronounced multiple resonances with a reduction of nanoparticle sizes.

Keywords: Localised surface plasmon resonance; Full width at half maximum; Gold nanoparticles (AuNP); Sodium citrate.

INTRODUCTION

The rising motivation in nanoparticle research is due to the famous quantum size, which makes them exhibit unique properties such as localised surface plasmon resonance (LSPR) from their bulk counterparts [1, 2]. These properties can be tailored by controlling the nanoparticle size, shape and concertation during synthesis [2]. One of the significant properties of the nanoparticle is their strong absorption of the optical spectrum [2, 3]. This has led to the widespread application of nanoparticles in the development of nano-devices for various applications such as physical, biomedical and biological [1, 4].

Several metal NP synthesis protocols have been developed. An approach to achieving a monodispersed metal NP is vital to attain a catalytic action with high accuracy [5]. The classical nucleation theory approach commonly uses the chemical reduction process with a low crystallisation potential reducing agent. To synthesise gold nanoparticles using a similar system, Au(III) was introduced in deionised water as hydrogen tetrachloroaurate [6]. Synthesis of AuNP with different sizes during a reduction process could be achieved in several ways. Reducing agent plays a critical role during chemical routines as it also serves as a capping agent and a pH mediator [7]. Variation in concentration levels of a given re-

ducing agent calculated by equation 1 gives rise to AuNPs of different sizes [6, 7].

$$C = \frac{m}{v} \times \frac{1}{MW}, \quad (1)$$

where *m* is the mass of solute, *v* is the volume of solution in litres and *mw* molar weight.

UV-Vis technique offers a reliable method of obtaining absorbance data from NPs useful in evaluating LSPR peak wavelength. Photons incident on a material can be transmitted, scattered or absorbed. The extent of photon absorption depends on the material's bandgap, and the absorbance scatter reveals whether LSPR peaks are within the material [8]. The LSPR peaks range determines whether the NPs were monodispersed or polydispersity. As the sizes of NPs decrease during the nucleation process, the LSPR undergoes a blue shift [8–10]. There is a strong relationship between LSPR peaks and FWHM value, revealing the lifetime of SPR from a nanoparticle [11]. The variation of LSPR wavelength and FWHM in a monodispersed can be used to determine the NP sizes as shown in Equation 2.

$$\lambda_{LSPR} = \lambda_0 + L_1 \exp(L_2 D), \quad (2)$$

where L_1 and L_2 are fit parameters and D is the nanoparticle size [11].

This variation has been used further to explain the NP size dependence on the pH of the reducing agent in a reduction process [12].

The LSPR peaks were obtained from absorbance spectra within the optical region of the spectrum. FWHM values for each height were obtained by fitting a Gaussian curve on each mount. These plasmonic properties were used in calculating the AuNP sizes for different molarities of the reducing agent.

MATERIALS AND METHODS

The glassware was cleaned by soaking them in a boiling solution of weak sodium carbonate for 10 minutes to remove grease or fat. Then they were rinsed with acetone, followed by deionised water. They were dried in the oven heated at 110oC for 6 hrs. Hydrogen tetrachroloaurate (III) trihydrate ($HAuCl_4$-$3H_2O$, 99.9%), sodium citrate ($Na_3C_6H_5O_7$, 99.0%), citric acid and hydrochloric acid were sourced from sigma Aldrich and of analytical grade.

AuNPs used in this study were synthesised using the Turkervich method [6]. Gold salt, 0.1wt% hydrogen tetrachloroaurate was used as the base of AuNPs. It was dissolved in deionised water, and the solution was topped to 50 ml. It was heated to boiling under vigorous magnetic stirring. A reduction bumper, Na3Ctr, was introduced to the resolution, and heating continued for 23 minutes until no further colour change was noted. The answer was cooled to room temperature under magnetic stirring. The process was repeated for different pH values of Na_3Ctr.

The absorbance data of the colloidal AuNPs was determined using a UV Vis spectrophotometer, and OriginPro software was used to plot the absorbance spectra. A Gaussian curve was fitted in each absorption peak to obtain the corresponding plasmon wavelength used to determine AuNP sizes, as in Equation 2.

RESULTS AND DISCUSSION

Figure 1 shows a linear fit for reducing the buffer's molarity and corresponding pH values. The rate of change was uniform at 100 l/mMol.

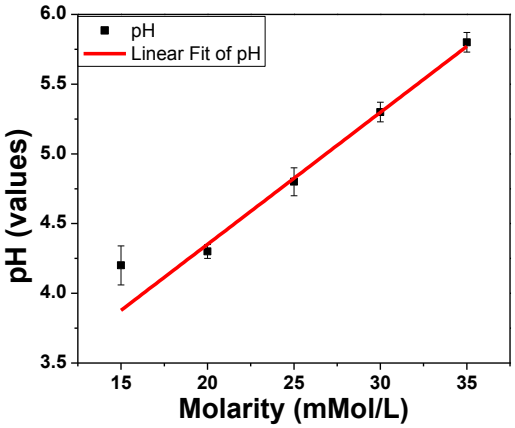


Figure 1 – Plot of pH versus molarity of sodium citrate

Thus, the reducing agent had high reduction potential with low crystallisation within the considered concentrations, and no solubility limits were reached. This made it an effective reducing agent and an excellent capping agent during the chemical process [13]. The spike in pH value at low molarity is due to the precipitation of Na_3Ctr. The

variation of pH in a reducing agent during the chemical process plays a crucial role in controlling the morphology and sizes of NPs [13, 14]

The AuNPs nucleation phases were presented by colour change during the reduction process within 18 minutes. Adding Na3Ctr to the $HAuCl_4$-$3H_2O$ while heating under vigorous magnetic stirring shows the reduction of Au(III) into colourless Au(0). The dark violet colour attained within 13 min was due to the formation of Au nanowires as an intermediate step during the nucleation process. This is consistence with Au nanowires absorbing most of the optical spectrum, giving the solution a dark violet colour [15].

Continued heating made the solution supersaturated, which led to the formation of spherical AuNPs. A blue shift in wavelength occurs with the AuNPs absorbing light in the blue–green regions giving the solution a wine-red colour.

Absorbance data from UV Vis confirmed the presence of AuNPs. Figure 3 shows absorbance spectra for colloidal AuNPs synthesised at different molarities of $Na_3C_6H_5O_7$. The LSPR peaks ranged from 518.2 nm to 521.0 nm as the molarity of the reducing agent was increased from 15 mM to 35 mM. The peaks exhibited a narrow shift of approximately 7.3 nm, indicating that NPs were monodispersed [16]. The presence of NPs was further tested using a laser beam, and Tyndall scattering was exhibited with all the samples obtained from varied molarity of reducing agent. For NPs with a diameter below 30 nm, the position of the LSPR peak is affected by interband transitions and electron density on the surface of the NP [17, 18].

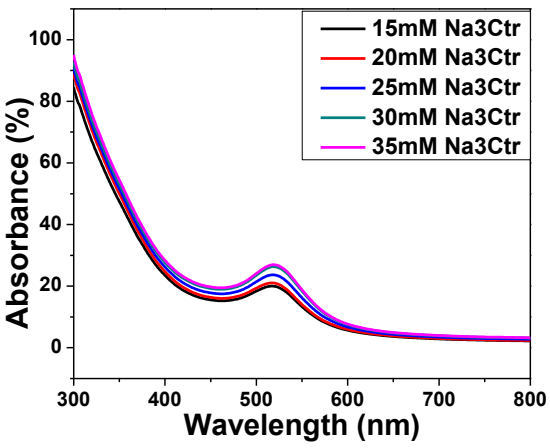


Figure 3 – Absorbance versus wavelength at selected molarities of Na3Ctr

For AuNPs, the interband transitions between the sp- and d- band with a sustained resonance of approximately 2.37eV, corresponding to a wavelength range of 520 nm, was noted.

To determine the FWHM values, a Gaussian curve was fitted in each of the absorption peaks. Figure 4 shows a Gaussian fit on 35 mM Na_3Ctr spectra, giving an FWHM value of 45.5 nm. The process was repeated for other molarities, and the values of FWHM obtained were recorded in Table 1. The values ranged from 45.51 nm to 51.04 nm, which were very low compared to the wavelength of the incident photons. Typical values of FWHM value give high integrity features to the AuNPs hence a better signal-to-noise ratio.

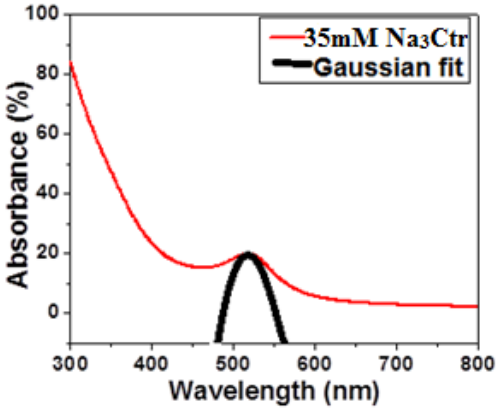


Figure 4 – Gaussian fit on a curve plot of absorbance versus wavelength on selected spectra

The lifetime of any SPR depends on the width of the absorption peak. The smallest width corresponded to a rise from 35 mM Na_3Ctr, representing NPs having the smallest size. The FWHM and the LSPR peaks depend on aggregation within the NPs colloidal with FWHM used to determine the dispersity of NPs

Table 1 – Variation of LSPR peak with FWHM

Molarity (mMol/l)	LSPR peak (nm)	FWHM (nm)
15	521.0	51.04
20	520.0	48.01
25	519.0	45.60
30	518.5	45.54
35	518.2	45.51

AuNP sizes were determined from their absorbance data within the optical spectrum. The measures were found to decrease with an increase in the molarity of the reducing agent, as

shown in Figure 5. The Boltzmann fit within the range of nanoparticle sizes had a coefficient of 0.20788. The rate of change of nanoparticle sizes at low and high molarities was low, whereby the sizes decreased from 26 to 17 nm as obtained from Equation 2, while the molarity increased from 15 to 35 mM. The dimensions of AuNP received due to different molarities were below 30nm, consistent with AuNP obtained from the variation of volume of the reduction agent [19]. The decrease in size is attributed to a complete reduction process, LSPR dipole coupling effect and electron interchange at NP orbits.

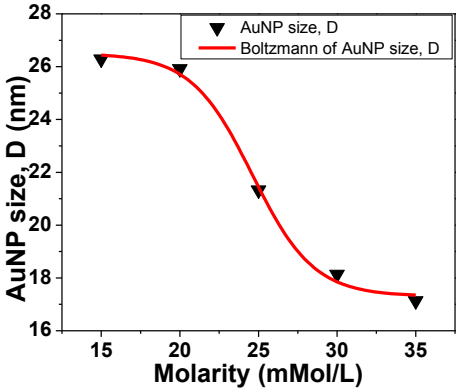


Figure 5 – Variation of AuNP sizes with the molarity of reducing agent

CONCLUSIONS

The pH values of sodium citrate used as a reducing agent increased linearly with molarity. No solubility limits were attained. A colour change consistent with gold nanoparticles absorption during nucleation was witnessed during the reduction process. Absorption peaks for AuNPs occurred at approximately 520 nm, with a narrow shift in LSPR wavelength for various concentrations being observed. The values of FWHM for all samples were relatively small, ranging from 45.51 to 51.04 nm, a clear indicator for quality AuNPs to foster a sustained Plasmon lifetime, making them suitable for application in photonics.

REFERENCES

1. Heiligtag, F. J., & Niederberger, M. (2013). The fascinating world of nanoparticle research. *Materials Today, 16*(7–8), 262–271. doi: 10.1016/j.mattod.2013.07.004
2. Jeevanandam, J., Barhoum, A., Chan, Y. S., Dufresne, A., & Danquah, M. K. (2018). Review on nanoparticles and nanostructured materials: history, sources, toxicity and regulations. *Beilstein Journal of Nanotechnology, 9*, 1050–1074. doi: 10.3762/bjnano.9.98
3. Kelly, K. L., Coronado, E., Zhao, L. L., & Schatz, G. C. (2002). The Optical Properties of Metal Nanoparticles: The Influence of Size, Shape, and Dielectric Environment. *The Journal of Physical Chemistry B, 107*(3), 668–677. doi: 10.1021/jp026731y
4. Mandal, G., & Ganguly, T. (2011). Applications of nanomaterials in the different fields of photosciences. *Indian Journal of Physics, 85*(8), 1229–1245. doi: 10.1007/s12648-011-0149-9
5. Liu, L., & Corma, A. (2018). Metal Catalysts for Heterogeneous Catalysis: From Single Atoms to Nanoclusters and Nanoparticles. *Chemical Reviews, 118*(10), 4981–5079. doi: 10.1021/acs.chemrev.7b00776
6. Turkevich, J., Stevenson, P. C., & Hillier, J. (1951). A study of the nucleation and growth processes in the synthesis of colloidal gold. *Discussions of the Faraday Society, 11*, 55. doi: 10.1039/df9511100055
7. Ajitha, B., Kumar Reddy, Y. A., Reddy, P. S., Jeon, H.-J., & Ahn, C. W. (2016). Role of capping agents in controlling silver nanoparticles size, antibacterial activity and potential application as optical hydrogen peroxide sensor. *RSC Advances, 6*(42), 36171–36179. doi: 10.1039/c6ra03766f

8. Roberts, G. C. K. (Ed.). (2013). *Encyclopedia of Biophysics*. doi: 10.1007/978-3-642-16712-6

9. Piella, J., Bastús, N. G., & Puntes, V. (2016). Modeling the Optical Responses of Noble Metal Nanoparticles Subjected to Physicochemical Transformations in Physiological Environments: Aggregation, Dissolution and Oxidation. *Zeitschrift Für Physikalische Chemie, 231*(1), 33–50. doi: 10.1515/zpch-2016-0874

10. Zorić, I., Zäch, M., Kasemo, B., & Langhammer, C. (2011). Gold, Platinum, and Aluminum Nanodisk Plasmons: Material Independence, Subradiance, and Damping Mechanisms. *ACS Nano, 5*(4), 2535–2546. doi: 10.1021/nn102166t

11. Ringe, E., Langille, M. R., Sohn, K., Zhang, J., Huang, J., Mirkin, C. A., Van Duyne, R. P., & Marks, L. D. (2012). Plasmon Length: A Universal Parameter to Describe Size Effects in Gold Nanoparticles. *The Journal of Physical Chemistry Letters, 3*(11), 1479–1483. doi: 10.1021/jz300426p

12. Iravani, S., Korbekandi, H., Mirmohammadi, S. V., & Zolfaghari, B. (2014). Synthesis of silver nanoparticles: chemical, physical and biological methods. *Research in pharmaceutical sciences*, *9*(6), 385–406.

13. Khan, I., Saeed, K., & Khan, I. (2019). Nanoparticles: Properties, applications and toxicities. Arabian *Journal of Chemistry, 12*(7), 908–931. doi: 10.1016/j.arabjc.2017.05.011

14. Patungwasa, W., & Hodak, J. H. (2008). pH tunable morphology of the gold nanoparticles produced by citrate reduction. *Materials Chemistry and Physics, 108*(1), 45–54. doi: 10.1016/j.matchemphys.2007.09.001

15. Pong, B.-K., Elim, H. I., Chong, J.-X., Ji, W., Trout, B. L., & Lee, J.-Y. (2007). New Insights on the Nanoparticle Growth Mechanism in the Citrate Reduction of Gold(III) Salt: Formation of the Au Nanowire Intermediate and Its Nonlinear Optical Properties. *The Journal of Physical Chemistry C, 111*(17), 6281–6287. doi: 10.1021/jp068666o

16. Peng, S., McMahon, J. M., Schatz, G. C., Gray, S. K., & Sun, Y. (2010). Reversing the size-dependence of surface plasmon resonances. *Proceedings of the National Academy of Sciences, 107*(33), 14530–14534. doi: 10.1073/pnas.1007524107

17. Hashimoto, S., Werner, D., & Uwada, T. (2012). Studies on the interaction of pulsed lasers with plasmonic gold nanoparticles toward light manipulation, heat management, and nanofabrication. *Journal of Photochemistry and Photobiology C: Photochemistry Reviews, 13*(1), 28–54. doi: 10.1016/j.jphotochemrev.2012.01.001

18. Wilcoxon, J. P., Martin, J. E., & Provencio, P. (2001). Optical properties of gold and silver nanoclusters investigated by liquid chromatography. *The Journal of Chemical Physics, 115*(2), 998–1008. doi: 10.1063/1.1380374

19. Ngumbi, P. K., Mugo, S. W., Ngaruiya, J. M., & King'ondu, C. K. (2019). Multiple plasmon resonances in small-sized citrate reduced gold nanoparticles. *Materials Chemistry and Physics, 233*, 263–266. doi: 10.1016/j.matchemphys.2019.05.077