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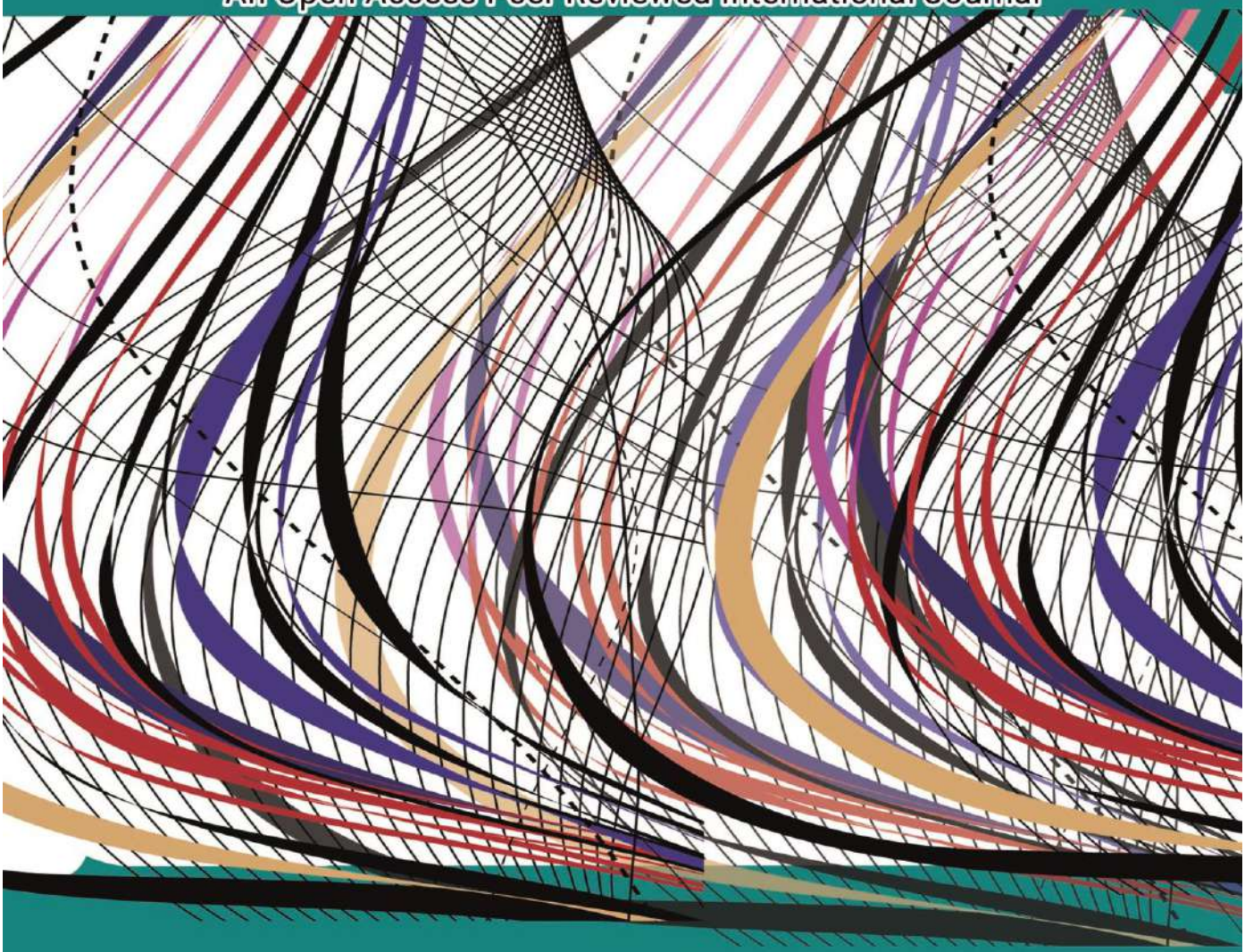

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FOREWORD

I am pleased to put into the hands of readers Volume-5; Issue-12: Dec, 2019 of **"International Journal of Advanced Engineering, Management and Science (IJAEMS) (ISSN: 2354-1311)" ,** an international journal which publishes peer reviewed quality research papers on a wide variety of topics related to Science, Technology, Management and Humanities. Looking to the keen interest shown by the authors and readers, the editorial board has decided to release print issue also, but this decision the journal issue will be available in various library also in print and online version. This will motivate authors for quick publication of their research papers. Even with these changes our objective remains the same, that is, to encourage young researchers and academicians to think innovatively and share their research findings with others for the betterment of mankind. This journal has DOI (Digital Object Identifier) also, this will improve citation of research papers.

I thank all the authors of the research papers for contributing their scholarly articles. Despite many challenges, the entire editorial board has worked tirelessly and helped me to bring out this issue of the journal well in time. They all deserve my heartfelt thanks.

Finally, I hope the readers will make good use of this valuable research material and continue to contribute their research finding for publication in this journal. Constructive comments and suggestions from our readers are welcome for further improvement of the quality and usefulness of the journal.

With warm regards.

Dr. Dinh Tran Ngoc Huy
Editor-in-Chief
Date: Jan, 2020

Editorial Board/ Reviewer Board

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Practical Local Geoid Modelling of Benin City, Nigeria from Gravimetric Observations Using the Modified Stokes Integral

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Abstract**—** *The geometric heights obtained from GNSS observations cannot be used for engineering works as they are not reduced to the geoid. This study presents practical local geoid modelling from gravimetric observations using the modified Stokes integral for engineering applications in Benin City. A total of 52 points were observed with GNSS receivers and a gravimeter to respectively obtain their positions and absolute gravity values. The theoretical gravity values of the points were computed on the Clarke 1880 ellipsoid to obtain their local gravity anomalies. The modified Stokes integral was applied to compute the geoid heights of the points. The combined topographic effect was applied to the computed geoid heights of the points to obtain their precise geoid heights. The mean of the precise geoid heights of the points was computed to obtain the local gravimetric geoid model of the study area. The determined geoid model was validated for its reliability as well as the accuracy using the RMSE index. It is recommended that the use of assumed, as well as handheld GPS receiver heights for engineering works should be totally abolished as this study has established the local geoid model of Benin City.*

Keywords**— *gravimetric observations, integration,* local geoid, *modelling, modified Stokes integral.***

I. INTRODUCTION

The geoid is an equipotential (level) surface of the earth's gravity field which coincides with mean sea level (MSL) in the open oceans. As such, the geoid provides a meaningful reference frame for defining heights. The importance of accurately modelling the geoid has increased in recent years with the advent of satellite positioning systems such as the Global Navigation Satellite System (GNSS). GNSS provides height information relative to a best-fitting earth ellipsoid rather than the geoid (Seager *et al.*, 1999; Yilmaz and Arslan, 2006). To convert ellipsoidal heights derived from GNSS to conventional (and meaningful) orthometric heights, the relationship between the geoid and the ellipsoid must be known (Kotsakis and Sideris, 1999; Yilmaz and Arslan, 2006). The fundamental relationship that ties ellipsoidal heights obtained from Global Navigation Satellite System (GNSS) measurements and heights with respect to a vertical datum established using spirit levelling and gravity data, is to the first approximation given by (Heiskanen and Moritz, 1967; Krynski and Lyszkowicz, 2006; Oluyori *et al.*, 2018) as:

$$h = H + N \tag{1}$$

Where h is the ellipsoidal height, H is the orthometric height, and N is the geoid undulation. Figure 1 shows the relationship between the orthometric, geoid and ellipsoidal heights.

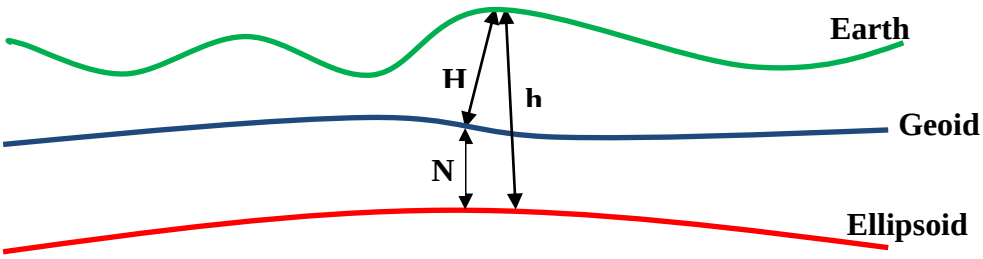

Fig: 1: Relationship between Orthometric, Geoid and Ellipsoidal Heights
Source: Eteje *et al.* (2018)

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Geoid Modelling is carried out by various methods such as the gravimetric, geometric, Astro-geodetic, transformation and gravimetric-geometric methods. The gravimetric method can be carried out by the application of the well-known Stokes-integral, equation (2) and the use of accurately determined absolute gravity data (Heiskanen and Moritz, 1967, Eteje, 2015 and Eteje *et al.*, 2018).

$$N = \frac{R}{4\pi\gamma}\iint_{\sigma}\Delta g S(\psi)d\sigma \qquad (2)$$

Where N is geoid undulation, Δg is gravity anomaly, $S(\psi)$ is Stokes function, γ is normal gravity on the reference ellipsoid and R is mean radius of the earth.

The application of the Stokes integral for local geoid modelling requires the solving/integration of the modified Stokes integral given in equation (2). Here, the geoid height of each point in a study area is computed and corrected for the combined topographic effect to obtain a precise geoid height of the point. The geoid model of the area of study is the average, as well as the mean of the geoid heights of the selected/observed points. The accuracy of the model is obtained using the Root Mean Square Error (RMSE) index. The RMSE of the model is computed by comparing the results obtained from physical measurements carried out on some selected points with their corresponding results from the determined geoid model.

The geometric heights obtained from GNSS observations cannot be used for engineering works such as the installation of communication mast, road construction, building construction, the building of crude oil facilities, line and underground drainage construction, bridges, viaduct and tunnel constructions. The geometric, as well as ellipsoidal heights can be converted to practical heights reduced to the geoid, as well as the mean sea level. The conversion of the geometric heights of points to orthometric heights requires the knowledge of the geoid-ellipsoid separations of the points. Orthometric heights are required in engineering constructions to decide on suitable gradients to direct the flow of water and to decide on various levels of proposed constructions. With orthometric height, water can flow from one point to another while with ellipsoidal height, it is impossible. Benin City is the capital of Edo State. It is a developing area which requires a geoid model for meaningful and physical developments. Therefore, this study determines the local geoid model of Benin City from gravimetric observations using the modified Stokes' integral.

1.1 The Study Area

Benin City is the capital of Edo State in Southern Nigeria. It is a City approximately 40 kilometres north of the Benin River. The City is also linked by roads to Asaba, Sapele, Siluko, Okene, and Ubiaja and is served by air and the Niger River delta ports of Koko and Sapele. The City is made up of three Local Government Areas, Oredo LGA, Ikpoba Okha LGA and Egor LGA. It has a total population of 1,749,316 according to 2019 NPC projection. It covers a total area of about 1,204 km². Benin City is bounded by UTM zone 31 coordinates 660000mN and 712500mN, and 770000mE and 815000mE. Figures 2a and b show the maps of the study area.

Fig. 2a: Map of Edo State

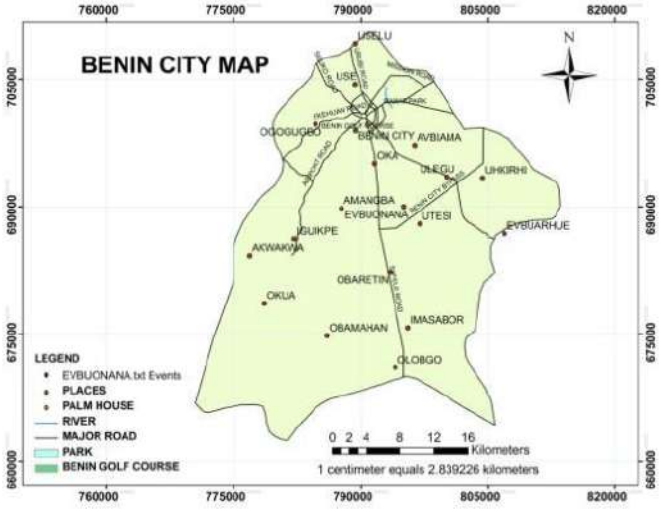

Fig. 2b: Map of Benin City

Source: Ministry of Lands and Surveys, Benin City

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1.2 Integration of Stokes's Formula

According to Eteje *et al.* (2018), using the modified Stokes integral given in equation (2), the geoid heights of points can be computed if their gravity anomalies and geographic coordinates are known. Featherstone and Olliver (1997) gave the integration of equation (2), as well as the Stokes integral as

$$N = \frac{r\Delta g}{8\gamma}\left(\begin{array}{l} -6\sin^2\psi_o \ln\left\{\sin\left(\frac{\psi_o}{2}\right)+\sin^2\left(\frac{\psi_o}{2}\right)\right\}+16\sin\left(\frac{\psi_o}{2}\right)+12\sin^2\left(\frac{\psi_o}{2}\right) \\ -24\sin^3\left(\frac{\psi_o}{2}\right)-12\sin^4\left(\frac{\psi_o}{2}\right)-4\cos\psi_o+5\cos 2\psi_o-1 \end{array}\right) \quad (3)$$

Where N is the geoidal height of individual point, ψ_o is the surface spherical radius, γ is the theoretical as well as normal gravity, Δg is the gravity anomaly and $r = R$ is the mean radius of the earth. So, the computation of the geoid heights of points using equation (3) requires the use of the surface spherical radius, ψ_o, theoretical, as well as normal gravity values, γ, gravity anomalies, Δg, and the mean radius of the earth, $r = R$ of the points.

1.3 Surface Spherical Radius Computation

The surface spherical radius, ψ_o is computed as (Shrivastava *et al.*, 2015)

$$\cos\psi = \sin\varphi\sin\varphi^1 + \cos\varphi\cos\varphi^1\cos(\lambda^1 - \lambda) \quad (4)$$

Where,

φ = Mean latitude of the points

φ^1 = Latitude of individual point

λ = Mean longitude of the points

λ^1 = Longitude of individual point

1.4 Gravity Anomaly Computation

The gravity anomaly, Δg, is the difference between the observed gravity value (g) reduced to the geoid, and a normal, or theoretical, computed gravity value (γ_o) at the mean earth ellipsoid, where, the actual gravity potential on the geoid equal the normal gravity potential at the ellipsoid, at the projection of the same terrain point on the geoid and the ellipsoid respectively, that is (Dawod, 1998 and Eteje *et al.*, 2019)

$$\Delta g = g - \gamma_o \quad (6)$$

Considering the nature of the topography of the earth surface, which is irregular in shape, there are two basic types of gravity anomalies (free air and Bouguer anomalies). In this study, it was only the free air correction that was applied.

1.5 Theoretical Gravity Computation

To obtain the local gravity anomalies of points in a study area, the normal, as well as the latitude gravity, is computed on a specified ellipsoid. That is, the ellipsoid adopted for geodetic computation in the area or region of study. Eteje *et al.* (2018) gave the model for the computation of the theoretical gravity on the Clarke 1880 ellipsoid as

$$g_{T\,Clarke1880\,(B)} = 9.780519381\begin{pmatrix}1+0.005247463\,6\sin^2\varphi \\ -0.000008798\,5\sin^2 2\varphi\end{pmatrix}\mathrm{ms}^{-2} \quad (5)$$

Where,

$g_{T\,Clarke1880}$ = Theoretical gravity on the Clarke 1880 ellipsoid

φ = Station latitude

1.6 Free Air Correction

This is the first step for reducing topography effects. It simply corrects for the change in the elevation of the gravity meter, considering only air (hence a free-air) being between the meter and selected datum. According to Aziz *et al.* (2010), this correction is added to the observed gravity because the increased radial distance of the station from the centre of the Earth results in a lower observed gravity value than if the station were at the local datum. The formula to calculate the magnitude of the reduction in practice is given by Eteje *et al.* (2019) as

$$g_{FA} = -\frac{2g}{r}H_s = -308.6H\mu Gal = -0.3086HmGal \quad (7)$$

Where,

H = Station orthometric height in metres

g = Mean value of gravity (980500 mGal)

r = Mean radius of the Earth

1.7 Mean Radius of the Earth Computation

The mean radius of the earth, r = R was computed using:

$$R = \sqrt{MN} \quad (8)$$

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Where M is the radius of curvature along the meridian section and N is the radius of curvature in prime vertical. The formula for computation of the radius of curvature in prime vertical, N is given as (Ono, 2009)

$$N = \frac{a}{(1-(2f-f^2)\sin^2\varphi)^{1/2}} = \quad (9)$$

while that for computation of the radius of curvature in meridian section, M is given as (Kotsakis, 2008)

$$M = \frac{a(1-e^2)}{(1-e^2\sin^2\varphi)^{3/2}} \quad (10)$$

Where,

a = Semi-major axis

φ = Latitude of an observation point

$e^2 = 2f - f^2$ = Eccentricity squared (Eteje *et al.*, 2019)

$f = \frac{a-b}{a}$ = Flattening

b = Semi-minor axis

1.8 Combined Topographic Effect Computation

To obtain a precise geoid height of a point, the combined topographic effect is calculated and applied to the computed geoid height of the point. The formula for the computation of the combined topographic effect, δN_{Comb}^{Topo} is given as (Sjöberg, 2000 and Kuczynska-Siehien *et al.*, 2016):

$$\delta N_{Comb}^{Topo} = -\frac{2\pi G\rho}{\gamma}\left[H^2 + \frac{2}{3R}H^2\right] \quad (11)$$

Where G is the earth gravitational constant, ρ is density, R is the mean radius of the earth and H is the orthometric height of observation point which can be obtained from the DTM of the area.

1.9 The Geoid Model

The final gravimetric geoid model is the mean of the geoid heights computed with equations (3) and (11) and it is obtained using

$$\text{Gravimetric Geoid Model} = \frac{1}{n}\sum_{i=1}^{n} N_i \quad (12)$$

Where,

N_i = Geoid height of points computed using equations (3) and (11),

n = Total number of points

1.10 Accuracy of the Gravimetric Geoid Model

The accuracy of the determined local gravimetric geoid model is obtained using the Root Mean Square Error, RMSE index. To evaluate the determined local gravimetric geoid model accuracy, the orthometric heights computed from the differences between the model geoid heights and ellipsoidal heights of some selected points are compared with their (the points) respective orthometric heights obtained from spirit levelling to get the residuals. The computed residuals and the total number of points are used to calculate the RMSE of the model. The Root Mean Square Error, RMSE index for the computation of gravimetric geoid model accuracy as given by Kao *et al.* (2017) and Eteje and Oduyebo (2018) is

$$RMSE = \pm\sqrt{\frac{V^TV}{n}} \quad (13)$$

Where,

$V = H_{Observed} - H_{Model}$ (Residual)

$H_{Observed}$ = Observed Orthometric Height of Point

H_{Model} = Model Orthometric Height of Point

n = Number of Points

II. METHODOLOGY

The adopted methodology was divided into different stages of data acquisition, data processing, and results presentation and analysis. Figure 3 shows the adopted methodology flow chart.

2.1 Data Acquisition

A total of 52 points were used in the study. The points included two primary control stations (XSU 92 and XSU 100 were respectively located in Edo College and School of Nursing premises). The other 50 points were selected along the major roads of the City (See Figure 4). Spirit levelling was carried out on 3 of the 50 points for validation purpose. GNSS observations were carried out using CHC 900 dual-frequency GNSS receivers to obtain the coordinates and ellipsoidal heights of the points. The observations were carried out relative to control station XSU 92 using the static method (See Figures 5 and 6).

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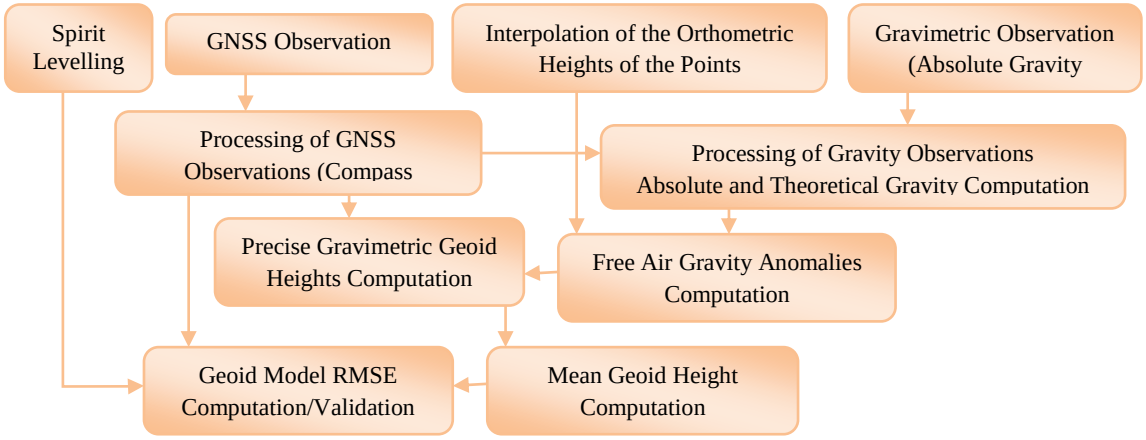

Fig 3: Flow Chart of the Adopted Methodology

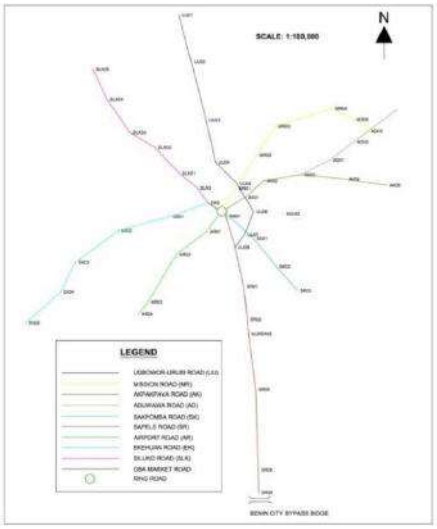

Fig 4: Selected GPS and Gravity Points

Fig. 5: Base Receiver at Control Station XSU92

Fig. 6: Rover Receiver at One of the Selected Points (RR01) at Ring Road

The selected points were observed with a gravimeter (SCINTREX CG-5 Autograv Gravimeter) to obtain their absolute gravity values. The observations were carried by an expert, a Geophysicist from Mountain Top University, Ibafo, Ogun State. The gravity observations of the points were carried out in seven different loops relative to a point whose absolute gravity value was known and located within the Benin City Airport premises (See Figures 7 and 8).

Fig. 7: Gravimeter Set over Reference Station at Benin City Airport

Fig. 8: Gravimeter at One of the Selected Points at Bypass along Benin-Sapele Road

Spirit levelling was carried out on the 3 validation points, as well as test points using control station XSU100 as a point of known orthometric height to obtain their practical heights. The levelling of the test points was carried out in

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two loops. The first loop started from control station XSU100 to TP1 and closed back on control station XSU100 while the second loop levelling started from TP1 through TP2 to TP3 and closed back on TP1. Figure 9 shows the validation points' levelling loops.

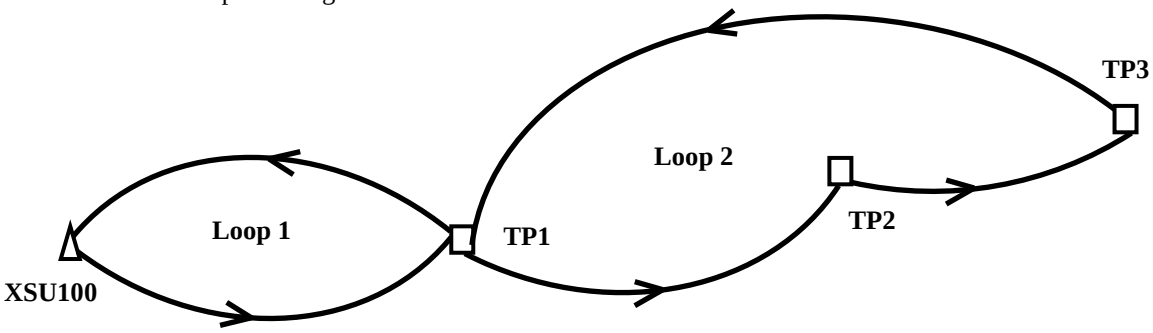

Fig. 9: Validation Points Levelling Loops

2.2 Data Processing

The GNSS observations were respectively downloaded and processed with HcLoader and Compass Post-processing software to obtain the positions and the ellipsoidal heights of the points. The coordinates and the ellipsoidal heights of the points were processed in Minna datum. The gravity observations of the points were processed by the expert who carried out the observation to obtain their absolute gravity values. All the necessary corrections such as drift correction, etc were applied during the processing. The theoretical gravity values of the points were computed on the local (Minna) datum ellipsoid (Clarke 1880 ellipsoid) using the latitude coordinates of the points, as well as equation (5). The gravity anomalies of the points were computed by finding the differences between the absolute gravity values of the points and their corresponding theoretical gravity values, as well as using equation (6). The computation of the free air correction requires the application of the orthometric heights of the points. And these were obtained by interpolation using the orthometric heights and the absolute gravity values of the two primary control stations (XSU 100 and XSU 96). The orthometric heights of the points were interpolated as there was no Digital Terrain Model (DTM) of the study area. The free air correction was applied to the computed gravity anomalies of the points using equation (7). The free air and the Bouguer gravity anomalies of the points were computed but the free air gravity anomalies were used in the study. This is because the geoid heights of the two primary control stations obtained from their known orthometric and ellipsoidal heights approximated the geoid heights of the stations computed using the free air gravity anomalies, as well as equation (3). The gravimetric geoid heights of the points were computed with the geographic coordinates, free air gravity anomalies and the theoretical gravity of the points using equation (3). The computation of the gravimetric geoid heights of the points required the application of the spherical radius and the mean radius of the earth. The spherical radius and the mean radius of the earth were respectively computed using equations (4) and (8). Also, the computation of the mean radius of the earth required the computation of the radius of curvature in prime vertical and in meridian section using equations (9) and (10) respectively. The computed gravimetric geoid heights of the points using equation (3) were co-geoid heights. To obtain precise gravimetric geoid heights of the points, the combined topographic effect has to be computed and applied to the co-geoid heights. The combined topographic effect was computed using equation (11). The final local gravimetric geoid model of the study area was obtained by finding the mean of the precise geoid heights of the points using equation (12). The spirit levelling of the validation points was reduced using the height of instrument method, as well as collimation method. The RMSE, as well as the accuracy of the model, was computed by finding the square root of the mean of the differences between the model and the observed orthometric heights of the validation points and the two control stations using equations (13).

III. RESULTS PRESENTATION AND ANALYSIS

3.1 Analysis of the GNSS Observation Results

The DGPS observations were carried out to obtain the coordinates and ellipsoidal heights of the selected points. The DGPS observations were processed using Compass post-processing software. From the processing of the DGPS observations results, it was seen that the processed observations passed both the Network Adjustment Test and the X-Square (Chi-square) Test. This implied that the normal matrix generated was a regular one and inverted accordingly for the calculation of residuals.

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3.2 Analysis of the Validation Points Levelling

Table 1 presents the closure errors/accuracy of the two loops of the validation points levelling. The levelling of the validation points was done to obtain the orthometric heights of the validation points. The levelling was carried in two loops. The first loop started from XSU100 to TP1 and closed back on XSU100 while the second loop started from TP1 through TP2 to TP3 and closed back on TP1. From Table 1 it is seen that the closure error of the first loop is -0.006m while the second loop closure error is 0.009m which were within millimetres standard. The results were accepted as the closing errors of the two loops. The high accuracy of the levelling was as a result of the fairly flat topography of the study area, the observer's know-how and the equipment used.

Table 1: Known and Observed Heights of the Closing Stations

Station	Description	$H_{(known)}$ (m)	$H_{(observed)}$ (m)	ΔH (m)
Loop 1	Starting and Closing Station (XSU100)	76.377	76.383	-0.006
Loop 2	Starting and Closing Station (TP1)	60.912	60.903	0.009

3.3 Analysis of the Gravimetric Geoid Model

Table 2 and Figures 10a and 10b respectively present the coordinates of the selected points, their corresponding computed local gravimetric geoid heights and the determined geoid model, and their surface and contour plots. The gravimetric geoid heights of the points were computed using the integration of modified Stokes' integral. The gravity anomalies of the points used for the computation of the local gravimetric geoid heights of the points were computed on the Clarke 1880 ellipsoid which is the ellipsoid adopted for local geodetic computation in Nigeria. From Table 2, it is seen that the determined geoid model (mean of geoid heights) is 2.066m. This implied that to convert ellipsoidal heights of points to orthometric heights in Benin City, 2.066m will be subtracted from the ellipsoidal heights of the points. Also, from Figures 10a and 10b, it is seen that at the centre, there are depressions with small cliffs closed to them while at some distances from the centre there are small depressions which implies that the geoid heights of the study area vary with no constant value.

Table 2: Coordinates of the Selected Points and their Respective Local Gravimetric Heights

STATION	Northing	Easting	Free Air Geoid Height, N Corrected for Combined Topographic Effect
XSU92	257998.9800	357763.3720	2.086
RR01	257885.3227	355124.0166	2.420
SR01	254586.4919	355927.3773	1.588
SR02	253034.8393	356093.6672	1.978
SR04	249754.3940	356486.6091	2.520
SR05	245976.7564	356615.1406	2.802
SR06	244918.0916	356628.3396	3.266
XSU100	252357.6855	356143.1412	2.098
AR01	257163.2838	354191.2450	0.685
AR02	256084.6701	352774.2792	0.720
AR03	253855.5374	351456.5724	1.436
AR04	253286.3364	351007.1375	1.439
UU01	267318.6942	352896.8470	4.658
UU02	265145.3515	353468.5482	3.498
UU03	262403.8368	354173.5295	1.981
UU04	260409.1199	354602.6925	1.276
UU05	259407.1043	355613.0973	1.346
UU06	258099.7270	356379.9681	1.489
UU07	257012.1709	355964.2081	1.329
UU08	256422.9868	355521.4167	1.263
AD01	260514.8753	359958.1194	2.986

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AD02	261374.7703	361092.6917	4.019
AD03	261867.2294	361745.9231	4.420
AK01	258765.7701	355982.5939	1.376
AK02	259528.7811	356853.3277	1.473
AK03	259836.4068	358613.7581	2.252
AK04	259620.2060	360694.5908	3.101
AK05	259332.1257	362604.6963	3.954
MR01	259195.6591	355569.5117	1.300
MR02	260751.5081	356528.1658	1.488
MR03	262096.1924	357412.2545	1.614
MR04	262930.8267	360077.3193	4.037
MR05	262428.2213	361076.8116	4.313
SK01	256829.9481	356396.3673	1.500
SK02	255516.1557	357459.1723	2.035
SK03	254396.4836	358439.3812	2.379
EKS	258508.0691	354257.9420	0.665
SLK0	259220.8416	353748.2583	0.668
SLK01	259894.0672	352909.3470	0.781
SLK02	261105.4062	351776.4441	1.326
SLK03	261813.3387	350594.2641	1.736
SLK04	263367.4251	349531.4676	2.688
SLK05	264774.9356	348869.1903	3.357
EK01	257862.9575	352479.5790	0.078
EK02	257209.3523	350068.7731	0.983
EK03	255709.4653	348058.3750	1.729
EK04	254327.4139	347366.3299	2.001
EK05	252877.2407	345740.0760	2.516
AIRPORT	256224.9627	352774.5959	0.578
GEOID MODEL (MEAN OF GEOID HEIGHTS) =			**2.066m**

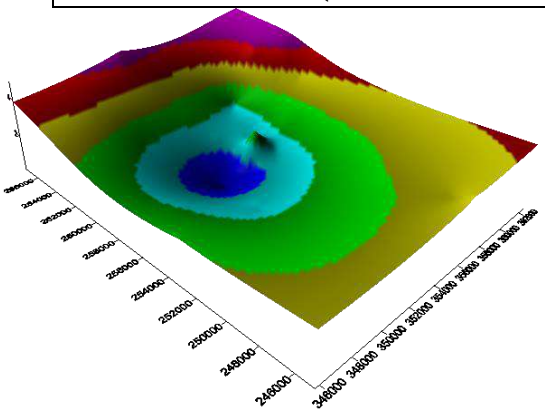

Fig 10a: Surface Plot of Gravimetric Geoid Heights of the Selected Points

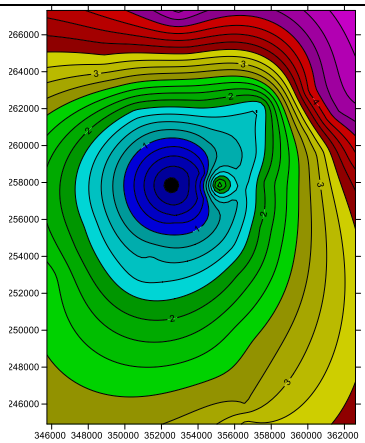

Fig 10b: Contour Plot of Gravimetric Geoid Heights of the Selected Points

3.4 Analysis of the Accuracy/Validation of the Determined Geoid Model

Table 3 and Figure 11 respectively present the computed RMSE of the geoid model and the plot of the model and the observed orthometric heights. This was

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done to present the consistency, as well as the reliability of the determined geoid model. It can be seen from Table 3 that the computed RMSE, as well as the accuracy of the determined gravimetric geoid model, is 0.412m. This implies that ellipsoidal heights can be converted to orthometric height with an accuracy of 41cm using the determined geoid model. It can also be seen from Figure 11 that the model and the observed orthometric heights of the validation points/stations are identical in shape which also implies the high reliability, as well as consistency of the determined gravimetric geoid model.

Table 3: Observed and Model Orthometric Height, and Model RMSE/Accuracy

STATION	DGPS ELLIPSOIDAL HEIGHT (m)	GEOID MODEL (m)	MODEL ORTHOMETRIC HEIGHT (m)	OBSERVED ORTHOMETRIC HEIGHT (m)	DIFF. B/W MODEL & KNOWN ORTHOMETRIC HEIGHTS (m)	DIFF. SQUARED
XSU92	106.668	2.066	104.602	105.441	0.839	0.704
XSU100	78.399	2.066	76.333	76.377	0.044	0.002
TP1	63.122	2.066	61.056	60.912	-0.144	0.021
TP2	53.326	2.066	51.260	51.605	0.345	0.119
TP3	64.069	2.066	62.003	62.068	0.065	0.004
					RMSE =	**0.412m**

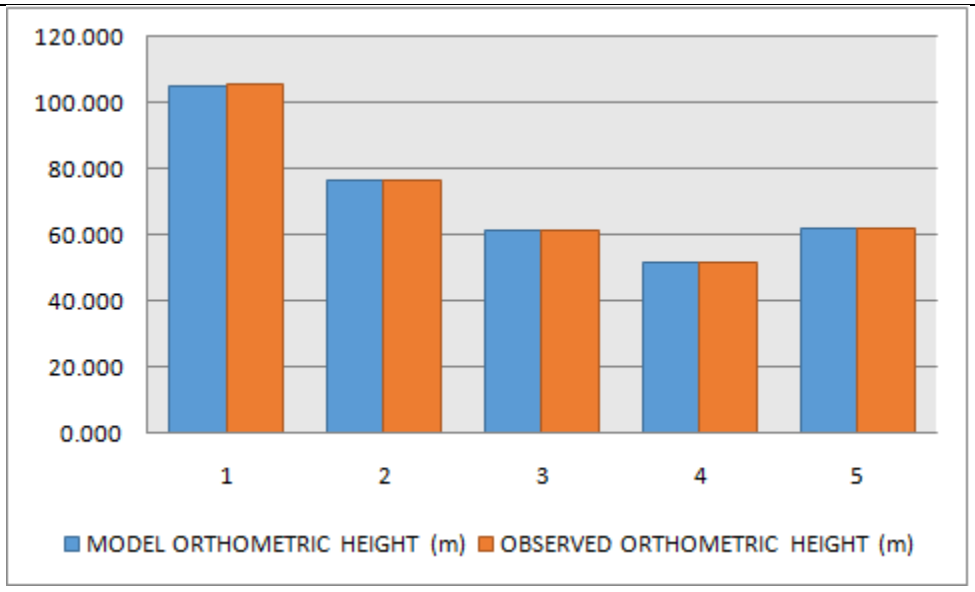

Fig. 11: Validation Points Model and Observed Orthometric Heights

IV. CONCLUSIONS AND RECOMMENDATIONS

1. The local geoid model of Benin City has been determined to be 2.066m using the gravimetric method of integration of modified Stokes formula.
2. The study has shown that ellipsoidal heights can be converted to orthometric heights with an accuracy of 0.412m using the determined geoid model.
3. It is recommended that the determined geoid model should be applied whenever ellipsoidal heights are to be converted to practical, as well as orthometric heights in Benin City.
4. It is also recommended that the use of assumed, as well as handheld GPS receiver heights should be totally abolished as this study has established the local geoid model of Benin City.

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A voltage sensitivity index application for power system load shedding considering the generator controls

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Abstract—*This paper proposes a method for calculating the minimum amount of power load needed to shed and distributing it for each load bus in order to recover the frequency and voltage back to the allowable range. Based on the consideration of the primary control of the turbine governor and the reserve power of the generators for secondary control, the minimum amount of load shedding was calculated in order to recover the frequency of the power system. Computation and analysis of Voltage Sensitivity Index (VSI) of the load bus to prioritize distribution of the amount power load shedding at these positions. The lower the load bus have the Voltage Sensitivity Index (VSI), the higher the amount of load shedding will shed and vice versa. With this technique, frequency and voltage value are still within allowable range, and a large amount of load shedding could be avoided, hence, saved from economic losses, and customer service interruption. The effectiveness of the proposed method tested on the IEEE 37 bus 9 generators power system standard has demonstrated the effectiveness of this method.*

Keywords— ***Load shedding, Voltage Sensitivity Index (VSI), Frequency control, Primary control, Secondary control.***

I. INTRODUCTION

The imbalance active power between the generation and the load demand causes a decrease the frequency in the power system. The monitoring and control system will immediately implement the control solutions to restore the frequency back to the allowable value, and improve the power system stability [1]. In [2], the primary and secondary control power plants are set by automatic controlled equipment or the power system operator. After implementing all possible control solutions that the system's frequency has not yet recovered to the allowable value, the most efficient method is to reduce the load [3]. The under-frequency load shedding relay (UFLS) is the traditional load shedding method used quite commonly in the current power system. In [4], the relays are set to operate whenever the frequency drops to a specified level and a fixed amount of load power is shed to restore the frequency. Using under frequency load shedding relay to disconnect the load bus will make in insufficient or excessive load shedding and take a long time to restore the frequency back to stable. This result will make damages for the suppliers and customers using the system's power. The authors in [5], [6] showed methods to estimate the amount load shedding, which based on the frequency reduction, or the rate of change of frequency (ROCOF). The combination of Intelligent load shedding methods has also been studied and developed such as Artificial Neural Network (ANN) [7], fuzzy logic algorithms [8], genetic algorithm (GA) [9] or particle swarm optimization (PSO) algorithm. These methods minimize the load shedding costs at steady state operation of pow system [10], [11].

A good load shedding program should be shed with the minimum number of load buses and as quickly as possible, and must meet the system's permissible frequency conditions. On the other hand, in large disturbances of the power system, frequency decay is often associated with voltage decay. Voltage decay at load buses reduces system load, therefore the reduction in frequency is slowed and the actual load shedding by UFLS is reduced relative to the level required [12] - [14]. In most practical conditions, the amount of load shedding may be more or less the amount of power the system needs to maintain the frequency, which may lead to cost losses as well as affects the objects that the system serves.

This paper presents a new method of load shedding to minimize the amount of load shedding power. The load

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shedding strategies based on the Voltage Sensitivity Index (VSI) to find out the priority and distribute the amount of load shedding power for each load bus. For load buses, the lower the load bus have the Voltage Sensitivity Index (VSI), the higher the amount of load shedding will shed and vice versa.er system [10], [11].

II. METHODOLOGY

2.1 Overview the power systerm frequency responds

The basic concepts of speed governing are best illustrated by considering an isolated generating unit supplying a local load as shown in Figure 1.

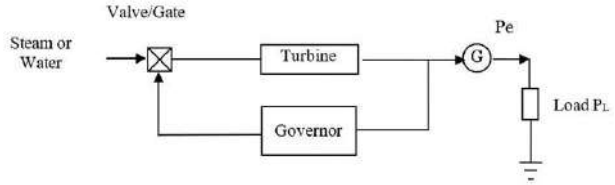

Fig. 1: Generator provides independent load

The power system loads are a composite of a variety of electrical devices. For resistive loads, such as lighting and heating loads, the electrical power is independent of frequency. In the case of motor loads, such as fans and pumps, the electrical power changes with frequency due to changes in motor speed. The references [15], [16] showed the overall frequency-dependent characteristic of a composite load:

$$\Delta P_e = \underbrace{\Delta P_L}_{Nonfrequency-sensitive-load-change} + \underbrace{D\Delta\omega}_{Frequency-sensitive-load-change} \quad (1)$$

where: ΔP_L - is the load component does not depend on frequency, eg heat load, lighting, ...; $D\Delta\varpi_r$ - the change in load depends on the change of frequency, eg, motors, pumps, etc;ΔP_e Deviation of power change;$\Delta\omega_r$: Deviation of angle speed change; D: The percentage change in load with percentage of change in frequency varies, D is from 1 ÷ 2%.

The transfer function block diagram reflects the relationship between the load change and the frequency taking into account the governor characteristic, the prime mover and the load response shown in Figure 2 [17].

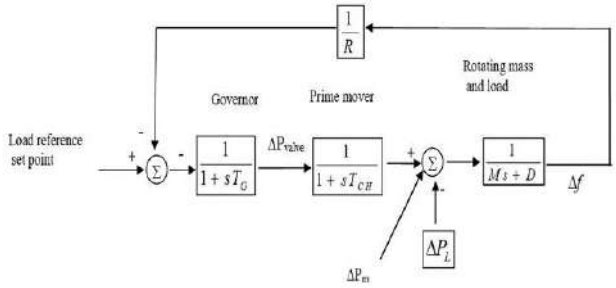

Fig. 2: The transfer function block diagram describes the relationship between the load changes and frequency

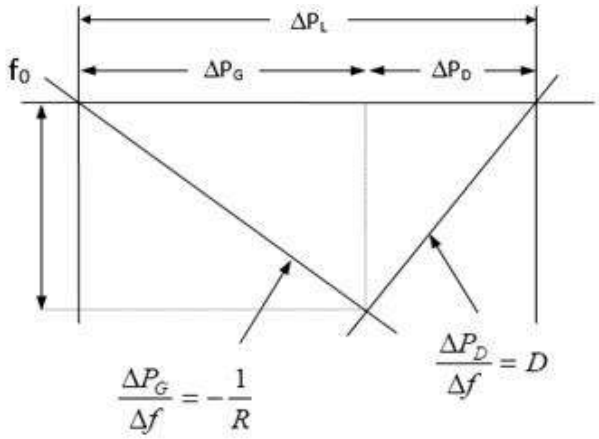

Fig. 3: The effects of the governor speed droop and the frequency of load on the net frequency [18].

The transfer function relating the load change, ΔP_L , to the frequency change, $\Delta\omega$, is

$$\Delta f(s) = \Delta P_L(s)\left[\frac{\frac{-1}{Ms+D}}{1+\frac{1}{R}\left(\frac{1}{1+sT_G}\right)\left(\frac{1}{1+sT_{CH}}\right)\left(\frac{1}{Ms+D}\right)}\right] \quad (2)$$

Where: K_G the amplification stage; ω_{ref} reference speed; T_{CH} "charging time" time constant; ΔP_{Valve} per unit change in valve position from nominal; Ms angular momentum of the machine in Laplace transform; R is equal to pu change in frequency divided by pu change in unit output; it is characteristic for the sliding speed adjustment; $R = -\Delta f / \Delta P$

The purpose of system simulation in the form of a transfer function is to calculate the time response of the frequency deviation when the load change step is ΔP_L. From the above description, frequency deviation in steady state it means the values of the transfer function is determined for s = 0:

The steady-state value of $\Delta f(s)$ may be found by:

$$\Delta f \text{ steady state} = \lim_{s\to 0}\left[s\Delta f(s)\right] = \frac{-\Delta P_L\left(\frac{1}{D}\right)}{1+\left(\frac{1}{R}\right)\left(\frac{1}{D}\right)} = \frac{-\Delta P_L}{\frac{1}{R}+D} \quad (3)$$

When the power system has multiple generators with independent governors, the frequency deviation in steady state is calculated according to formula (4).

$$\Delta f = \frac{-\Delta P_L}{\frac{1}{R_1}+\frac{1}{R_2}\ldots+\frac{1}{R_n}+D} \quad (4)$$

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Set $\beta = \left(\frac{1}{R_{eq}} + D\right)^{-1}$ is the general frequency response characteristic of power system. It includes the adjustment characteristics of turbine mechanical power and load. From formula (4), obtain:

$$\Delta f = -\Delta P_L . \beta \quad (5)$$

2.2 Primary and secondary frequency control in the power system

Primary frequency control is an instantaneous adjustment process performed by a large number of generators with a turbine power control unit according to the frequency variation. Secondary frequency control is the subsequent adjustment of primary frequency control achieved through the AGC's effect (Automatic Generation Control) on a number of units specifically designed to restore the frequency back to its nominal value or otherwise, the frequency-adjusting effects are independent of the governor's response called the secondary frequency control. The process of the primary and secondary frequency control was shown in Figure 4.

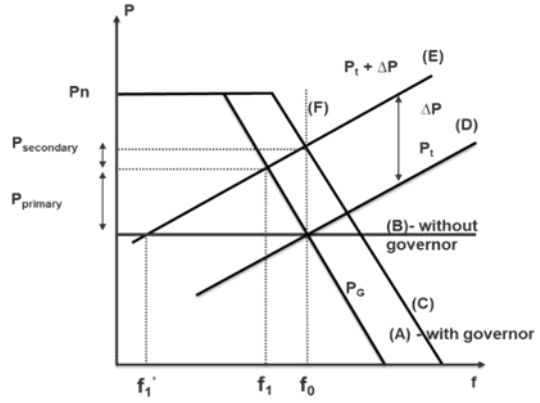

Fig. 4: The relationship between frequency deviation and output power deviation.

Characteristic line (A) shows the effect of the governors: change the turbine power according to the change of frequency:

In balance mode, the intersection of the generator characteristic line (A) with the frequency characteristic of the load line (D) determines the frequency f_0 equal 50Hz (or 60 Hz). When the load increases ΔP_L, the new characteristic line will be line (E): $P_t+\Delta P$. In addition, the intersection of the generator characteristic line (A) with the new load characteristic line (E) defines the new frequency f_1. Here, $f_1 < f_0$. Compared to the case where the generator does not have a governor, characteristic line (B), it is clear that: $f_1 < f_0$. According to the characteristic line (A) of the generator unit, the governor does not prevent the frequency reduction: $\Delta f = f_0 - f_1$

However, because the generator has the governor, it has helped to limit the large deviation of the frequency. Compared with the case the generators do not have a governor (B), the intersection with the new characteristic line of the load (E) will determine the frequency f_1: $f_1' < f_1 < f_0$. Thus, the governor of the generator unit has the effect of reducing the large change of frequency known as the primary frequency controller. The efficiency of the primary frequency control depends on the slope of the speed-droop characteristic of the generator units. In the ideal case, the adjusting characteristic line (F) of the generator unit is vertical line; the frequency will not change until the power limit of the generator unit P_n.

The above characteristics of the primary adjustment process lead to the need for external intervention (by the automatic control device or by the power system operators) - that is the secondary frequency control process. The secondary adjustment characteristic is represented by the simultaneous shifting of the characteristic line (A) into the characteristic line (C) of the generator unit, with the slope unchanged. This adjustment is equivalent to the creation of a static vertical adjustment characteristic line (F). Thus, the secondary adjustment is within the rated power range of the generator unit to restore and maintain the frequency within the allowable value.

2.3 Calculate the minimum load shedding power considering the control characteristic of turbine mechanical power and load

In the 60Hz power system, the frequency deviation allowed Δf_p is 0.3 Hz (Δf_p = -0.3Hz). In the case of the power deficiency or imbalance between the source and the load causing the frequency difference, the frequency control will be implemented in the following order: primary control, secondary control. When the reserved power is used for secondary control and the frequency has not been restored to the permitted value, the load will be shed. Thus, from formula (5), the relationship between the permissible change in frequency, the amount of secondary control power and the minimum load shedding power P_{LSmin} is calculated according to the proposed formula below:

$$\Delta f_p = -\beta.[\Delta P_L - (\Delta P_{\text{Secondary control}} + P_{LS\,\min})] \quad (6)$$

In this case, if $(\Delta P_{\text{Secondary control}} + \Delta P_{\text{LS min}}) < \Delta P_{\text{Sacondary max}}$, then $\Delta P_{LSmin}=0$, otherwise the minimum power load shedding is calculated by the formula below:

$$P_{LS\,\min} = \Delta P_L - \left(\frac{-\Delta f_p}{\beta}\right) - \Delta P_{\text{Secondary Max}} \quad (7)$$

Where: Δf_p is the permissible change in frequency (pu); P_{LSmin} is the minimum amount of power required to shed

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(pu); $\Delta P_{Secondary\ control}$ is the amount of secondary control power addition to the system.

2.4 The Voltage Sensitivity Index (VSI)

The main objective of calculating VSI is to find the most sensitive node of the system from voltage sensitivity point of view [19]. It considered a numerical solution, which helps operator to monitor how to shed the load to prevent frequency and voltage collapse. Nodes, having minimum voltage sensitivity index are selected and then, using equation (8) to calculate the voltage sensitivity index (VSI).

VSI at bus i, is defined as [20]:

$$VSI_i = \sqrt{\frac{\sum_{k=1}^{n}(1-V_k)^2}{n}} \quad (8)$$

Where V_k is voltage at k^{th} node and n is the number of nodes.

After calculating the minimum amount of load shedding power required, the next issue determines the distribution the amount of load shedding power at load buses. The node with least VSI will be picked as the best location for the load shedding. That mean, the amount of load shedding at different load buses can be calculated in the same way as the principle of the load sharing in the parallel circuit.

Due to parallel electrical circuits:

$$Y = \frac{1}{Z_{eq}} = \frac{1}{Z_1} + \frac{1}{Z_2} + ... + \frac{1}{Z_n} \quad (9)$$

$$Z_{eq} = \frac{1}{Y} \quad (10)$$

$$\frac{P_1}{P} = \frac{U^2}{Z_1}.\frac{Z_{eq}}{U^2} = \frac{Z_{eq}}{Z_1} \quad (11)$$

Equivalent formula follows:

$$\frac{P_i}{P} = \frac{Z_{eq}}{Z_i} \lfloor \frac{VSI_{eq}}{VSI_i} \quad (12)$$

Here, the general formula calculates the amount of load shedding distribution at nodes according to the Voltage Sensitivity Index (VSI): $P_{LSi} = \frac{VSI_{eq}}{VSI_i}.P_{LS\min}$ (13)

Where, n is the number of generator bus; i is the number of load bus; P_{LSi} the amount of load shedding power for the i bus (MW); $P_{LS\ min}$ the minimum amount of load shedding power to the restore of frequency back to the allowable value (MW); VSI_i: the Voltage Sensitivity Index (VSI) of the i bus; VSI_{eq}: the equivalent Voltage Sensitivity Index (VSI) of all load buses.

III. CASE STUDIES - SIMULATION AND RESULTS

The effectiveness of the proposed method is tested on the IEEE 37 bus 9 generators system [21] which is shown in Figure 5. Total the active power and the reactive power of the system are 1024.31 MW and 215.94 MVAR respectively under normal operating conditions. The maximum active power and reactive power of the system are 1087 MW and 449 MVAR. The control solutions minimize the amount of load shedding and maintain steady-state frequency from 59.7 to 60 Hz. To test the effectiveness of the proposed method, the outage situations of the generator units are calculated, simulated and tested the parameters. In the case of calculations and simulations, the spinning reserved power to control the secondary frequency is also considered. All test cases are simulated on PowerWorld GSO 19 software. The results are compared with the results of the traditional load shedding method using under frequency load shedding relay.

Apply the (5), (6), (7) formulas calculate the system frequency, the amount of primary and secondary control power and the amount of load to be shed. The results of the computation of the outage generator situations are shown in Table 1.

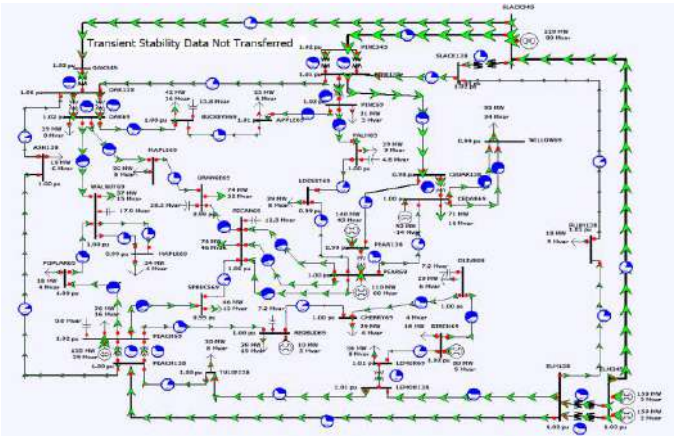

Fig. 5: The IEEE 37 bus 9 generators test system.

Table 1. The outage generators cases

Name of Gen. Bus	Frequency (Hz)	In the allow range	The primary control power value (MW)	The secondary control power value (MW)	The amount of load shedding (MW)
REDBUD	59.97	Yes	10	0	0
ELM345#1	59.56	No	150	12.5	27.77
ELM345#2	59.56	No	150	12.5	27.77
PEACH69	59.62	No	112.31	16.32	11.89
CEDAR69	59.86	Yes	52	0	0
BIRCH69	59.79	Yes	80	0	0

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PEAR138	59.6	No	140	17.38	15.91
PEAR69	59.7	Yes	110	0	0

In the test example, the sudden disconnection of the PEAR138#1 generator (bus 53) is simulated. Applying the equation (5) calculates the stable frequency value when the PEAR138#1 generator (bus 53) disconnects from the system. The frequency value is 59.57 Hz, and shows in Figure 6.

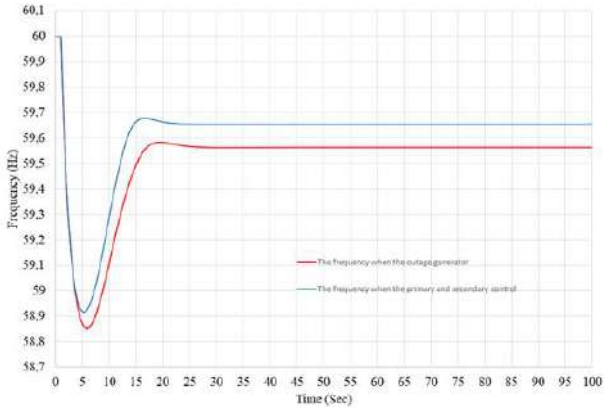

Fig. 6: The frequency of the system when the PEAR138#1 generator disconnects

After the PEAR138#1 generator suddenly disconnects, the frequency value is less than the allowable value. Therefore, the primary control and secondary frequency control which presented in section II.2 for frequency recovery should be implemented.

The primary control process is done automatically by the turbine governor after the PEAR138#1 outage generator. The value of the primary control power of each generator turbine is shown in Table 2.

Table 2. The value of the primary control power of the generators

Generator	The increased primary control power of each generator (MW)
REDBUD69 (bus 14)	5.2
ELM345#1 (bus 28)	23.6
ELM345#2 (bus 28)	23.6
SLACK345 (bus 31)	32.8
PEACH69 (bus 44)	21
CEDAR69 (bus 48)	7.5
BIRCH69 (bus 50)	11.2
PEAR138 (bus 53)	0
PEAR69 (bus 54)	15.1
	Total = 140 MW

Because the recovery frequency is less than the allowable value, so the secondary control is implemented after the primary control. The spinning reversed power of the generators will be mobilized to perform the secondary control. In this case, the secondary control power is 17.38 MW. The frequency of the system after the implementation of the secondary control is shown in Figure 6.

Thus, after performing the secondary control, the recovery frequency is 59.65 Hz and has not yet returned to the allowed value. Therefore, the final solution is load shedding. Equation (7) is applied to calculate the minimum amount of load shedding power to recovery the frequency in allowable value.

$$P_{LS\min} = \Delta P_L - \left(\frac{\Delta f_p}{\beta}\right) - \Delta P_{\text{Secondary Max}}$$

$$= 1.4 - \left(\frac{0.3}{0.00482x60}\right) - 0.1738 = 0.1591pu = 15.91MW$$

After calculating the minimum load shedding power, the load shedding distribution at the load buses is calculated. The amount of load shedding at load buses based on the Voltage Sensitivity Index (VSI) value of all load buses. Calculation steps at section II.4 are applied to calculate the Voltage Sensitivity Index (VSI) value of all buses. The Voltage Sensitivity Index (VSI) value and the voltage at load bus (pu) at all load buses is shown in Figure 7.

The priority load shedding distribution for each load bus is calculated based on the following principle: The lower VSI, the greater the amount of shedding power. Equation (7) in Section II.3 is applied to calculate the amount of disconnection power value at the load buses.

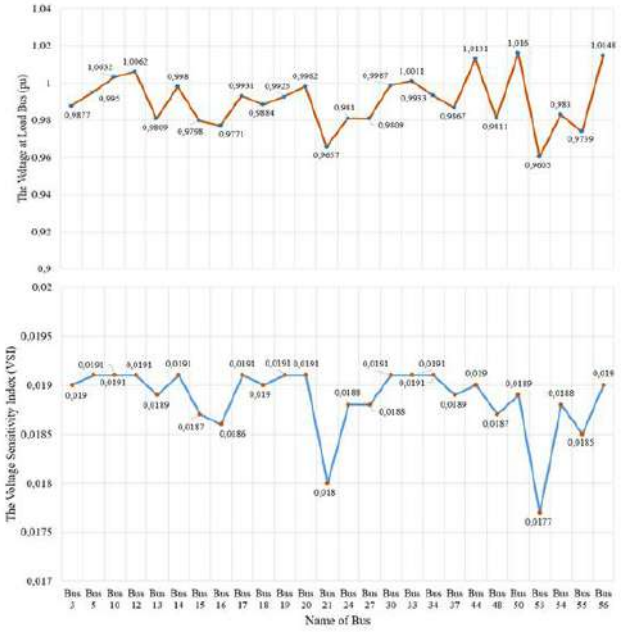

Fig.7. The VSI and the voltage at load buses (pu) after the outage generator (PEAR138)

In order to compare the effectiveness of the proposed method, the load shedding method using under frequency load shedding relay is used to compare. The process of UFLS is implemented when the frequency reduces below

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the frequency setting threshold. The load is usually cut step-by-step based on the load shedding table that pre-designed based on the general rule and operator experience. These tables guide the amount of load that should be cut at each step depending on the decrease of frequency. These values are shown in Table 3.

Table 3. The UFLS scheme using load shedding table[22]

The steps UFLS	Frequency (Hz)	Time delay (s)	The amount of load shedding (the percent of total load) (%)	Total amount of load shedding (%)
A	59.7	0.28	9	9
B	59.4	0.28	7	16
C	59.1	0.28	7	23
D	58.8	0.28	6	29
E	58.5	0.28	5	34
F	58.2	0.28	7	41
J	59.4	10	5	46

The frequency and the rotor angle comparison between the proposed method and the UFLS method are presented in Figure 8.

It can be seen that the proposed load shedding method has less the amount of shedding (76.28 MW) than the UFLS. Here, the recovery frequency value of the proposed method is lower than the UFLS method. However, this value is still within allowable parameter and acceptable range (59.7Hz). Especially, when considering the voltage value of the proposed method is equivalent to the UFLS method, although this method has less the amount of load shedding than UFLS method. This can be explained by the fact that a large load at load nodes with the lower VSI are disconnected causing the voltage to recover faster. Figure 9 and Figure 10 show that the voltage at all nodes after load shedding according to the proposed method and the UFLS method is near the same.

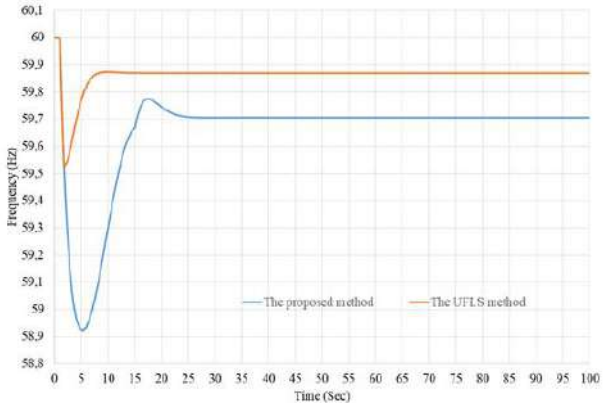

Fig. 8: The frequency comparison between the proposed method and the traditional method

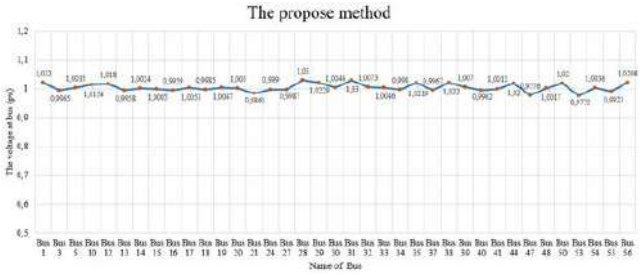

Fig.9: The voltage at all bus when load shedding according to proposed method

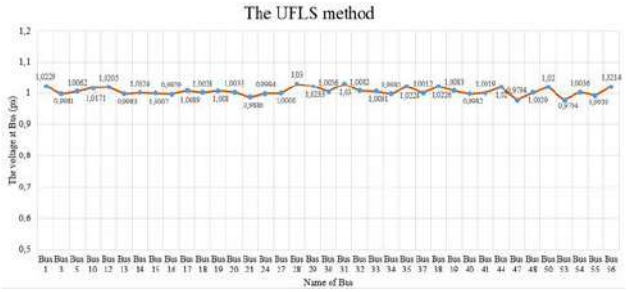

Fig.10: The voltage at all bus when load shedding according to the UFLS method

IV. CONCLUSION

A load shedding method considers to the primary and secondary control elements of the power plant to calculate the minimum amount of load shedding power and restore the frequency back to the allowable value. The proposed method ensures the frequency and voltage of the system in case of a severe generation–load mismatch. The selection of location and distribution of load shedding power at load buses are based on the Voltage Sensitivity Index (VSI) concept. The effectiveness of the proposed method has been demonstrated on a 9-machine, 37-bus system under test cases. The performance of this method is found to be better than that of a conventional UFLS scheme. The test results show that the proposed method results in reduced amount of load shedding while satisfying the operating conditions and limitations of the network.

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Expected Skills of newly hired business education Graduates

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Abstract— *This study determined the expected skills of newly hired Business Education Graduates. The study is Descriptive in nature. Survey questionnaire and Convenience sampling were utilized in data gathering. For the Data treatment and analysis, frequency count, percentages and weighted mean were utilized. The results of the study revealed that Business Representatives expected the newly hired Business Education Graduates as possessing holistic skills such as Academic skills, Technical skills, and Personal and social skills.*

Keywords*— *Expectation; Business Education; Academic skills, Technical skills, personal and social skills.

I. INTRODUCTION

Unemployment and underemployment have increased significantly within recent years. The annual unemployment rate in 2017 was estimated 5.7%, and annual underemployment rate was 16.1% as reported by the Philippine Statistics Authority Office. Based on recent studies, there are numerous causes of unemployment and underemployment and one of which is lack of adequate training and education. As stated also in the report, based on educational attainment, 16.5% of the unemployed were college graduates, 14.6% were college undergraduates and 31.1% were high school graduates As can be seen from the report, the lack of competency among those individuals makes them less favored for they are seem raw since high school graduates having the highest percentage in the unemployment rate, need more to be honed and be developed holistically. This made them seem not ready for employment.

Most people believe and perceive that teaching and learning processes are derived from studies in academic classrooms only. But when students analyze everyday cognition, they will discover that school-based learning and learning in practical setting have significant discontinuities. They cannot assume that what they learn in school is enough theory for human learning. Nor can they make significant development toward improving school effectiveness without a better grasp of what makes school a special place for education with its particular strengths and problems. For these reasons, students need to enlarge their understanding of what out-of-school teaching and learning actually entail and how its characteristics compare with school-based learning activities. (Schibner and Sachs, 2003).

Universities and Colleges have only just begun to understand that knowledge, aside from what are found in books and lectures or on the internet is actually constructed in collaborations among learners, interaction with practitioners, and being in the field itself.

The research aimed to gather expected skills from newly hired Business Education Graduates as viewed by selected Business Representatives. This Research will serve as reflective evaluation. The information will be of guide to better provide the needed attributes and skills for Business Education Graduates.

II. OBJECTIVES OF THE STUDY

1. To describe the Expected Skills of Newly hired Business Education Graduates in terms of:
   1.1 academic skills;
   1.2 technical skills; and
   1.3 personal and social skills.
2. To identify the type of skill most expected by employers.
3. To propose support activities for skills enhancement.

III. METHODOLOGY

The study is Descriptive in nature since its focus was determining the Expected Skills of Newly hired Business Education Graduates. The instruments utilized were questionnaire and convenience sampling. Available Business Representatives became the respondents of the study. A total

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of 24 Business Representatives were the respondents. For the Data treatment and analysis, frequency count, percentages and weighted mean were utilized.

IV. CONCEPTUAL FRAMEWORK

The basis of the study is from the The RAND Research Institute and Graduate School of America (2003) as cited by Santos, (2005), as stated, knowledge has two dimensions, the explicit and the tacit. The explicit dimension deals with concepts, and the know whats, whereas the tacit dimensions deals with knowhow.

Know how is best manifested in work practices and skills. Since the tacit lives in action, it comes alive in and through doing things and in participation with each other and the world.

Universities and Colleges have only just begun to understand that knowledge rather than being found in books and lectures or on the internet is actually constructed in collaborations among learners. People learn most powerfully when they come together and explore the intensive aesthetic of practitioner communities.

V. RESULTS AND DISCUSSION

1. Expected Skills of Newly hired Business Education Graduates

1.1 Academic Skills

Table.1: As to Academic Skills

ITEM	WM	VI
1.1 know the basics in office work.	3.96	Expected
1.2 know all phases of his/her work and related matters.	3.79	Expected
1.3 do task and instructions correctly.	4.33	Most Expected
1.4 plan and organize work so as to make effective use of time, materials and equipment.	4.33	Most Expected
1.5 organize and develop ideas to get things started.	4.08	Expected
1.6 simplify work or workload.	4.42	Most Expected
1.7 update knowledge about new development in the field of specialization.	4.00	Expected
1.8 integrate other field of knowledge to enrich effective working.	3.92	Expected
1.9 detect errors and correct them.	3.75	Expected
1.10 accomplish work on time.	4.29	Most Expected
1.11 grasp situations and draw correct conclusion.	3.92	Expected
General Weighted Mean	4.07	Expected

Table 1 shows the responses of the respondents regarding their expectations on the academic skills of newly hired Business Education Graduates, "simplify work or workload" got the highest weighted mean of 4.42 with a verbal interpretation of "Most Expected" and "detect errors and correct them." got the lowest weighted mean of 3.75 with a verbal interpretation of "Expected".

This means that, employers most expect their newly hired Business Education Graduates to have the competence of making their work easier for accomplishment. Work smart through finding means to accomplished task and save time. For primarily employees are hired for works to be done. As supported by Schwartz (2014) "Work simplification resulting to job accomplishment is valuing the company's time".

1.2 Technical Skills

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Table.2: As to Technical Skills

II. Technical skills		
	WM	**VI**
2.1 develop techniques in the completion of work on time.	3.96	Expected
2.2 apply theories and experiences.	4.00	Expected
2.3 perform actual business duties and responsibilities.	4.33	Most Expected
2.4 apply ability in clerical work, typing, encoding, programming, inventory work, check important documents, etc.	4.42	Most Expected
2.5 apply ability to operate/use office facilities/equipment.	4.25	Most Expected
2.6 perform work appropriately according to standards.	4.25	Most Expected
2.7 practice orderliness and accuracy of performance.	4.21	Most Expected
2.8 evaluate objectively and accurately his/her performance and output.	4.21	Most Expected
2.9 contribute in the attainment of the company's objective.	4.21	Most Expected
General Weighted Mean	4.20	Most Expected

For the Technical Skills as Expectation of Employers from Newly hired Business Education Graduates, "apply ability in clerical work, typing, encoding, programming, inventory work, check important documents, etc." got the highest weighted mean of 4.42 with a verbal interpretation of "Most Expected" and "develop techniques in the completion of work on time." got the lowest weighted mean of 3.96 verbally interpreted also as "Expected".

The findings show that, employers most expect their employees to have the ability to apply theories learned to actual business operations. Simply because it is the basic.

As Loretto (2017) stated "Employers look for employees who require little supervision and direction to get work done in timely and professional manner".

1.3 Personal and Social Skills

Table.3: As to Personal and Social Skills

III. Personal and social skills		
	WM	VI
3.1 show concern for company facilities.	4.38	Most expected
3.2 get along with superiors and subordinates.	4.54	Most expected
3.3 show courtesy and respect for authority.	4.79	Most expected
3.4 show courtesy and respect for co-workers.	4.83	Most expected
3.4 come to office regularly.	4.46	Most expected
3.5 lead and inspire others to achieve given objective.	4.21	Most expected
3.6 communicate effectively.	4.25	Most expected
3.7 accept accountability.	4.33	Most expected
3.8 self-reliant, resourceful and willing to accept responsibility.	4.75	Most expected
3.9 respond to changing requirement and condition.	4.50	Most expected
3.10 help others to improve and progress in his/her craft.	4.33	Most expected
3.11 shows enthusiasm and interest towards his/her work as well as the work of others.	4.33	Most expected
3.12 manage his/her time, and those of others.	4.38	Most expected
3.13 accept workload.	4.42	Most expected
3.14 share his/her expertise.	4.50	Most expected
3.15 wear the prescribed uniform/office attire.	4.67	Most expected
General Weighted Mean	4.78	Most Expected

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For the Personal and Social Skills, "show courtesy and respect for co-workers." got the highest weighted mean of 4.83 with a verbal interpretation of "Most Expected" and "practice orderliness and accuracy of performance." got the lowest weighted mean of 4.21 verbally interpreted also as "Most Expected".

The findings show that, Employers expect newly hired Business Education Graduates to show good professional relationship with co-employees for every employee is part of a team, working as a team and not working in isolation as what Deming (2017) said "Human interaction in the workplace involves team production, with workers playing off of each other's strengths and adapting flexibility to changing circumstances".

2. Skill most expected by employers

Table.4: Summary Table of Skills Expected by employers

SKILLS	AWM	VI
1. Academic Skills	4.07	Expected
II. Technical Skills	4.20	Most Expected
III. Personal and Social Skills	4.78	Most Expected
Overall Weighted Mean	4.35	Most Expected

As can be seen on the table above, Personal and social skills got the highest Average Weighted mean of 4.78 with a verbal interpretation of "Most Expected"

The result implies that employers most expect and prefer the newly hired employees to have the personal and social skills over academic skills and technical skills because currently in the Industry, consumers prefer more social interaction, attention and pampering. They view business people as problem solvers, who will make wonders for them. According to research conducted by the Carnegie Institute of Technology (2016) " 85% of Financial success is specifically related to emotional intelligence". As supported by Economy (2017) "Being able to understand another person's problems, as well as to convey that your understanding gives them a space of comfort , is a great skill to employ in the workplace".

3. Proposed Support Activities for Skills Enhancement

Based on the Results of the study the following Support Activities may be proposed

a. Strengthening Industry/Professional Organization Networking

Partnership with Professional Organizations will provide opportunities and avenue for students to attend and participate with the activities provided and sponsored by the said organizations. These will give them first hand experience of being in the actual scene. Currently companies are into:

1. Contests - wherein the students will be able to do jobs for them like product conception, advertising and promotion development and even selling.

2. Research – wherein the students will be sent on the field and will be interacting with the clients.

b. Peer Mentoring

Senior students may adopt students from lower year levels and mentor/assist them with their class activities and undertakings. Weekly consultations may be done in order to have regular communication, interaction, and collaboration about their experiences which will somehow help improve the communication skills and emotional stability.

c. Cross-Departmental Training

Interacting with students from different fields will help the business students widen their perspective and horizons. Widening one's perspective is a way of enriching one's ideas, creativities and emotional sensitivities and stabilities.

VI. CONCLUSION

As viewed on the above mentioned results of the study, the following conclusions were drawn:

1. Respondents expect the newly hired Business Education Graduates to possess the Academic skills, Technical Skills and Personal and Social Skills.
2. The type of skill most expected by the respondents from the newly hired Business Education Graduates is Personal and social skills.
3. Support Activities for Skills Enhancement may be proposed such as Strengthening Industry/Professional Organization Networking, Peer mentoring, and Cross-Departmental Training.

VII. RECOMMENDATION

1. Newly hired Business Education Graduates may also be respondents to the same or similar research study since they are the focus of the said study.
2. Benchmarking on other University Activities and Practices which centers on the focus of the study.
3. Regular assessment on the students' development focusing not only on Academic and technical skills but also on Personal and Social Skills may be conducted.

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4. Continuous conduction of Tracer Studies which will serve as feedback mechanism.

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The effectiveness of the OSGIPE learning model based on the Indonesian national qualification framework to improve soft skills of vocational high school technology students

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Abstract— *This research is a package that was carried out in a period of 3 years to develop a learning model based on the framework of Indonesia's national qualifications in an effort to improve students' vocational high school soft skills. The first year conducted last year found a draft learning model was found, namely the OSGIPE model. In this second year a formative trial was carried out on the OSGIPE model through individual, small group, and limited field trials. In the second year it was found that the OSGIPE model was feasible and effectively used to improve the soft skills of vocational high school technology students. There was a significant increase in students' soft skills by 23.05%. In the third year, a summative trial will be carried out, namely through a wide-scale test to see the effectiveness of the OSGIPE model for further dissemination.*
Keyword*— *OSGIPE instruction model, Soft Skills.

I. INTRODUCTION

Conceptually, competency-based curricula can be recognized as one of the means for implementing teaching and learning processes in the classroom to provide and broaden students' insights about knowledge, skills and other basic values in the hope that they can be reflected in the habits of thinking and acting. However, students have a very strong dependence on how they are treated by educators. That is, the success of students / students mastering competencies (learning outcomes) with regard to how lecturers / teachers practice learning systems in the implementation of learning.

The main problem in conceptually based Indonesian National Qualification Framework (KKNI) is how to relevance competencies (learning outcomes) with the framework of Indonesia's national qualifications contained in the planning and readiness of teachers / lecturers to manage their learning in order to achieve the desired competencies in students effectively , efficient, and interesting. Graduates' competencies for all educational institutions are related to *hard skills* and *soft skills*. In this regard, in general, education today is more about the development of hard skills (90%) than the development of *soft skills* that are only 10% (Santoso, 2008). In fact, the results of research in Europe show that a person's success in the business world is 80% determined by his *soft skills*and only 20% is determined by his *hard skills*(Wahidi in Santoso, 2008). This means that they prioritize *soft skills* rather than *hard skills for* graduates of educational institutions. The survey findings are in line with the opinion of Bergh, et al. (2006) which states that the human resources (HR) that will be able to exist in the 21st century are those who have *soft skills* strong, in the form of the ability to think creatively, productively, make decisions, solve problems, learn how to learn, collaborate, and self-management.

Workers often complain that workers from educational institutions who do not have good soft skills generally cannot stand the world of work, are not honest, get bored quickly, cannot work together, and cannot communicate verbally or write reports with good (Irma, 2007). Therefore, various survey results also show that in recruiting workers almost all companies prioritize *soft skills* applicants'rather than their *hard skills* (Sutabri, 2007; Admin, 2008).

From the description above, it can be concluded that reliable graduates from educational institutions expected by the business / industry are graduates who have high *soft skills* . If these reliable graduates are specified as graduates of Vocational High School (SMK), it means that the teaching staff (teachers) in Vocational Schools are required to first understand and have *soft skills* as expected by the

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business / industry to then form and / or develop them in their students through teaching and learning strategies. The logical consequence is that all Educational Teaching Institutions (LPTKs), including the UNIMED Faculty of Engineering's Mechanical Engineering Education Study Program, which will produce prospective teaching staff at Vocational Schools must also be able to form and develop these *soft skills* to their students as long as they attend college on campus. For this reason, the need for teachers / lecturers to design learning that can shape and develop *soft skills* that are clear and systematic, through needs analysis and developed by accommodating the demands of various stakeholders, and getting full support and commitment from all teaching staff (lecturers / teachers) in their implementation.

The implementation of the competency-based curriculum has been started in Vocational Schools since the 2006 school year. However, based on the results of the questionnaire given to students about the achievements of the *soft skills* designed in the learning implementation plan it turns out that it has not been in line with the target. Based on the survey of the practical learning process there were several problems. First, most students do not have the willingness to do the best and the standard or prioritize perfection, there is a tendency to just fulfill the task. Second, lack of systematic, well-coordinated work habits that reflect efficient and effective work. Third, lack of work independence, there is a tendency towards dependence on friends and teachers so that there are often process errors or products. Fourth, lack of initiative or creative ideas when encountering problems in the process or product, so the results are not optimal (Sudjimat, 2010). These problems are due to the learning pattern so far emphasizing the mastery of *hard skills* and giving less portion to the efforts to develop
soft skills so that they are side by side with *hard skills*.

This is thought to be caused by the learning strategies implemented not relevant to the characteristics of the field of study and the characteristics of students, as stated by Reigeluth (2009) that results that are effective, efficient and interesting are determined by the suitability of learning strategies with the characteristics of the study area and participants. Effective learning strategies are closely related to learning models. Kauchak and Eggen (2012) suggest that learning strategies are wrapped by learning models. Therefore, the assessment of learning strategies requires an assessment of the learning model. That is why the focus of the problems in this study were examined from the aspect of the learning model. The field of study or field of expertise in this study is limited to the field of design and construction, namely the design of metal splicing concentration machine elements.

The main problem in conceptual learning of vocational technology competencies is how to relevance learning outcomes with the Indonesian National Qualifications Framework contained in the planning and readiness of teachers to manage their learning in order to achieve the desired competencies in students, effectively, efficiently, and attractively, especially in field of welding technology. Achievement of learning outcomes is determined by the learning model applied. Therefore, the focus of the problem in this study is the development of an IQF-based learning model that can improve students' soft skills.

In this regard, the formulation of the problem in this study is:

How is the effectiveness of the Indonesian national qualification framework (KKNI) based learning model developed in an effort to improve students' soft skills?

II. LITERATURE REVIEW

Competence is basic knowledge, skills, and values reflected in the habit of thinking and acting. (Ministry of National Education, 2002). According to Burke (1995) *"being able to perform whole work roles, to the standards of expected employment in a real working environment"*. From this definition, there are three competency criteria: a) able to carry out the overall tasks of the employee, rather than having specific skills or work tasks; b) in accordance with the standards expected in the work; c) in a real work environment that puts pressure on and relates to all work and the actual variations of work.

From the report SCANS (1991) identifies 5 (five) competencies and 3 (three) basic parts of a person's skills and qualities to be able to handle work, namely: *The five competencies*: (a) *resources: identifies, plans, and allocates resources; (b) interpersonal: works well with others; (c) information: acquires and uses information; (d) systems: understands complex interrelationships; (e) technology: works with a variety of technologies. The three-part foundation consists of: (a) basic skills: reads, writes, performs arithmetic and mathematical operations, listens, and speaks effectively; (b) thinking skills: thinks creatively, makes decisions, solves problems, visualizes, knows how to learn, and reasons; (c) personal qualities: display responsibilities, self-esteem, sociability, self-management, integrity, and honesty.*

Competence is a basic characteristic that consists of skills, knowledge and other personal attributes (*soft skills*) that are able to distinguish a person from *performing* and not *performing.* Spencer & Spencer (1993) classifies

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competencies as basic characteristics, causal relationships and reference criteria as follows: 1) Basic characteristics are competence as part of an individual's personality and can predict behavior in situations and tasks, namely: a) motives as encouragement from self someone consistently to take an action; b) nature / character, namely physical characteristics and consistent responses to situations or certain information; c) self-concept, namely the values of attitudes or self-image possessed by individuals; d) knowledge, namely information that someone has for a particular field; and e) skills, namely the ability to carry out tasks physically or mentally. 2). Causal relationships are competencies that cause and predict behavior and performance. Motive competency, character / self-concept can predict behavioral actions that can ultimately predict performance results. 3). Reference criteria are the most critical competencies that can distinguish competencies with high or average performance. Thus vocational competence is a manifestation of one's abilities and skills to carry out overall vocational tasks in accordance with the expected standards in a real work environment.

Soft skills are non-technical competencies that point to personality characteristics. This can be seen in a person's behavior, both when interacting in social situations, language skills, personal habits, or important traits to support optimistic behavior. Based on this, it can be said that *soft skills* are the strength of oneself to change or to overcome various work problems. Mastery *soft skills* of students'is the essence of competence that must be mastered and measured through performance during learning. Learning *soft skills is* seen as part of the effort to form a professional attitude. This attitude will influence behavior caring for quality, fast, right, and efficient, respecting time and reputation (Djoyonegoro, 1998). The attitude formation must be carried out from the beginning through the process of habituation to work that is developed and harmonized with learning needs.

Wagner (2008) emphasizes seven *survival skills* that have important values in this 21st century era. When examined, *skills* theseare *soft skills*, namely: (1) critical thinking and problem solving, 2) collaboration through networks and leading with influence, (3) agile and able to adapt, 4) initiative and entrepreneurship, (5) effective communication both written and unwritten, (6) accessing and analyzing information; and (7) imagination and imagination. Thus, mastery of *soft skills is* important so that graduates are able to survive various work challenges.

Soft skills can be observed through performance such as speaking ability that reflects ideas and information, or clearly explains a topic, is easy to understand topics that are unknown, able to interact and work cooperatively in groups. A person with high mastery of *soft skills* will reflect abilities that exceed the capacity as a workforce. This ability arises because the person concerned is independently able to move internal processes to continue learning, trying and finding something that benefits his work or for self-development. Thus *soft skills are* important to master because they are needed by someone to develop themselves in doing work.

learning is *Soft skills* packaged using an integration model with some ease of consideration. This means that the implementation of learning follows thelearning pattern *hard skills* implemented in accordance with the applicable curriculum implementation, does not require special funding and is more useful for strengthening *hard skills*.learning of *softs skills* Integratedis implemented with aapproach *connected model*, and *nested models* (Forgarty, 1991 & Drake, 2007).

The integration of *connected models* emphasizes the relationship between *soft skills* and *hard skills* on every topic, concept, skill, and with the world of work today and in the future. *Nested models are* oriented towards achieving *multiple skills* and *multiple targets*. With this model, learning *soft skills* will be easily achieved because *soft skills* integratedare not forced. Every learning activity in it already has *soft skills* that are measured through learning targets.

Richey (1986) defines the model as an illustration that results from the fact that it has an arrangement of a certain sequence. According to him the model can be used to organize knowledge from various sources then used as a stimulus to develop hypotheses and construct theories into concrete terms / conditions to apply them to practice or test theories.

Gustafson and Branch (2002) which emphasizes the practical function of a model that is a means to facilitate communication, or regular instructions (algorithms) that are prescriptive in order to make decisions, or planning instructions for management activities. Furthermore, it is said that a good model is a model that can help the user to understand what the overall process is fundamentally. The basis of a good model is the connection of several theories. Thus, it can be said that the benefits of the model for the user include: (1) explaining several aspects of human behavior and interaction, (2) integrating what is known through observation and research, (3) simplifying complex humanitarian processes, (4) guidelines to carry out activities.

In relation to learning, the learning model serves to direct educators to design learning that is used as a guide in the implementation of learning in order to achieve effective, efficient, attractive, and humanistic learning.

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Joice (2009) explains the learning model is a plan or a pattern that is used as a guide in planning classroom learning or learning in tutorials and for determining learning tools and directing us to design learning to help learning participants so that learning objectives are achieved.

Kaufman and English (2008) distinguish 3 (three) types of development models to determine which ones are appropriate and appropriate to use, namely: (1) inductive models, which depart from students' current behavioral experiences, then grouped, compared, developed and finally evaluated for revisions, (2) deductive models, beginning with determining general goals, determining criteria, finding links between existing / partner elements, collecting data, formulating specific objectives, developing and implementing, then evaluating and revising , (3) classic models, starting with some general requirements of objectives, program development, program implementation, then evaluated and revised.

The University Consortium for Instructional Development and Technology (UCIDT) presents a model that can be applied to the development of learning (Wittich & Schuller (1999). The model includes 3 (three) stages: definition, development, and evaluation, divided into 9 (nine) with each of the 3 (three) steps and are interrelated with each other, namely:

Level I. Defining, including 1) Identifying the problem. In this first step what is done is identifying the problem, namely the gap between what is expected and the one that exists. More specifically, determine the conditions, what and what should be achieved by students, 2) The second step is the analysis of the situation, namely in an environment such as what learning is carried out, including students, learners (teachers), managers, and sources or materials learning, 3) The third step is organizing management, namely the executive leader who is responsible and carries out communication and other authorities.

Level II. Development, including 4) identification of objectives, as part of the development stage of learning begins with identifying specific learning objectives, if achieved, then the problem in the first step will be solved. In the formulation of goals must be stated: who are the participants or students *(Audiences)*, behavior *(Behavior)* what can be done after the program is completed, under conditions *(Condition)* what they are formed, and level *(Degree) of* expertise achieved, 5) selection special methods or learning methods used to achieve goals, 6) constructing blueprints or *prototypes*, namely the components used, such as teaching preparation, exam materials, and specific guidelines and program evaluation.

Level III. Evaluate, copy 7) test the *prototype*. The evaluation phase begins by testing each component of the program. This initial trial was conducted on small samples and observations were held to see the presentation. Student comments are used as an assessment of what they are achieving, 8) analysis of results. The data collected in step seven determines the significance of the extent of the contribution given by each component to achieving goals, useful or not, 9) implementation / revision. Program improvement is done by looking at the achievement of certain goals, by reevaluating the contribution of learning components to achieving goals.

Regarding the product design model, there are five learning design models identified. The five models are (1) Kemp (1977), (2) Banathy (1978), (3) Calvano (1980), (4) Paul Harmon (1982) and (5) Dick & Carey Models (2005).) Of the five models, the learning design model from Dick, Carey & Carey was chosen to be used in this study.

III. RESEARCH METHODS

This research uses development research methods. Conducted directly with descriptive data collection that processes and analyzes inductive data. To produce operational products, namely the KKNI-based learning model for the improvement of *soft skiils* effective, efficient and interesting student, a cycle of research and development is known as *"the R & D cycle"* (Borg & Gall, 2007) combined with a design model learning from Dick, Carey and Carey (2009).

In this study, survey methods were used through needs analysis, trial methods through procedures (a) expert review, (b) one-on-one trials, (c) small group trials, and (d) limited scale field group trials, and (e) trials of large-scale field groups to produce operational products.

Implementation of large group trials (field trials) will using quasi-experimental methods with the design of "*Pretest-Posttest Control Group Design"*.

Population and Sample

The population of this study were all students of the State Vocational School in the Field of Welding Technology in North Sumatra Province. The subjects of this study consisted of students from the State Vocational School of Welding Technology, each one from two cities and six regencies. This sampling uses a simple random technique. For individual tests consisting of 24 students, the small group test 64 students and for the field test 200 students

Data collection techniques used in this study were questionnaire techniques and interview techniques, as well as documentation techniques to capture data on needs analysis activities, questionnaire techniques to

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capture data about riviuwer responses and students on expert validation activities and one-on-one trials (individual test) and small group trials (small group test), and test techniques and observations on limited field testing activities as well as large-scale field trials.

The data analysis techniques used are (1) descriptive analysis to describe the data from the results of needs analysis and expert validation and one-on-one and small group trials. (2) t- test to find out the effectiveness of OSGIPE learning model for limited and wide-scale field testing.

IV. RESEARCH RESULTS AND DISCUSSION OF RESEARCH RESULTS

Based on the results of the analysis of the literature study, 10 soft skills were obtained which needed to be possessed by professional workers, namely 1) communication skills, 2) computer and technical literacy, 3) interpersonal skills, 4) adaptability, 5) research skills, 6) project management skills, 7) problem-solving skills, 8) process improvement expertise, 9) strong work ethics, and 10) emotional intelligence.

Based on the results of the needs analysis found six soft skills that must be owned by workers, namely 1) communication skills, 2) team work and collaboration, 3) adabtability, 4) problem solving, 5) critical observation, and 6) conflict resolution.

Based on the results of curriculum analysis of vocational technology (K13) found seven soft skills that must be possessed by graduates, namely 1) creative, 2) productive, 3) critical, 4) independent, 5) collaborative, 6) communicative, and 7) solutions.

Based on the results of learning analysis found the skills competency map (*hard skills*) as follows**.**

The KKNI-based welding technique learning model to improve soft skills as shown in Figure 2 above is still the initial model that will be continued through testing or through formative and summative evaluation as consistency of the application of the Dick, Carey and Carey (2005) models, consisting of six main steps , namely: 1) Orientation, including activities to build motivation, review the initial ability to explain objectives, 2) Select tasks, include activity description of conditions and analogies, 3) Guided exercises, including activities to provide examples, Group assignments, and Feedback, 4) Exercise Mandiri, covering individual task activities and feedback, 5) Projects, including problem analysis activities, alternative solutions, determining projects, completing projects, and 6) confirmation (testing), feedback, and follow-up.

The results of individual trials on the feasibility of the OSGIPE learning model were found to be an average of 76.25, the results of small group trials amounted to 80.75, and field test results amounted to 83.75, including good categories.

Based on the results of the pre-test and post-test there was an increase in student soft skills as an effect of the implementation of the OSGIPE learning model (the average pretest is 59.03 and the average posttest is 86.69). This shows that the increase occurred by 23.05%

Based on the results of the t test, showed that the increase was significant at the 95% significance level.

Discussion

The Learning Model of Welding Engineering Based on KKNI to improve soft skills as described earlier, is the initial product in this study which still requires further testing through formative evaluation and summative evaluation. According to the results of formative tests that have been done show that the OSGIPE learning model is effective for improving students' soft skills.

This is because the model has been built through theoretical studies of learning models that are thought to be able to foster personal competence, thinking skills, social competence, and vocational competence, as adapted from the learning models presented by Joyce, Weil, and Calhoun (2009), as well as Kauchak and Eggen (2012).

The learning model is also based on the characteristics of the field of study / expertise and characteristics of students. Reigeluth (1996) suggests that if the learning method is adapted to the conditions of learning it will produce effective, efficient, and attractive results. This is also supported by Nadler (1988) explaining that a good model is a model that can help the user to understand what the process is fundamentally fundamental. Furthermore, it is said that the basis of a good model is the relation of several theories. Because the building of the learning model has been based on the interrelationship between several theories, it can be assumed that the model will be effective, efficient and attractive.

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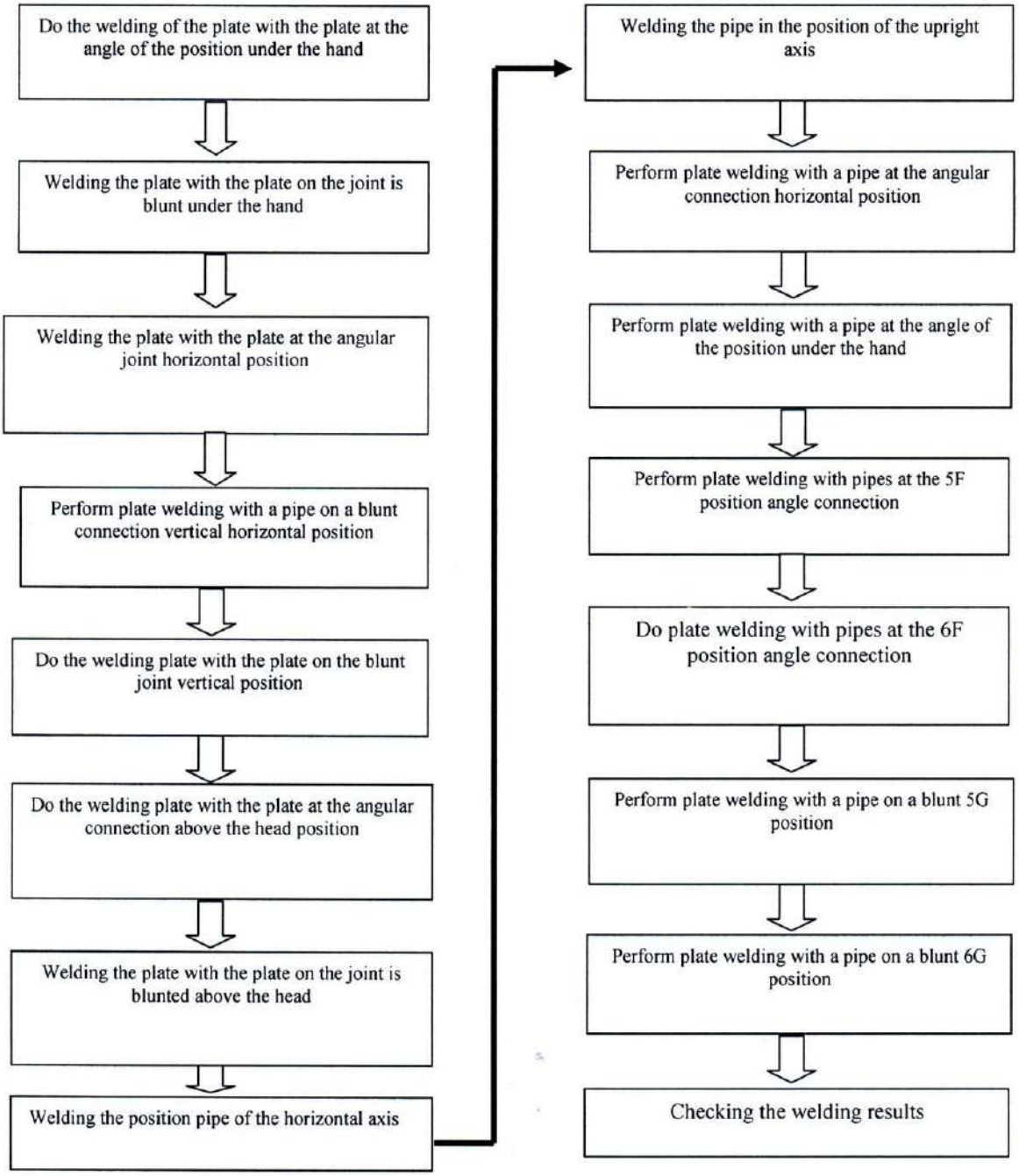

Figure 1. Wiring Skills Competency Map

Draft learning model based on the analysis of the results of the literature study and competency characteristics and characteristics of the field of study which in the process raises the soft skills that have been identified based on needs analysis as follows.

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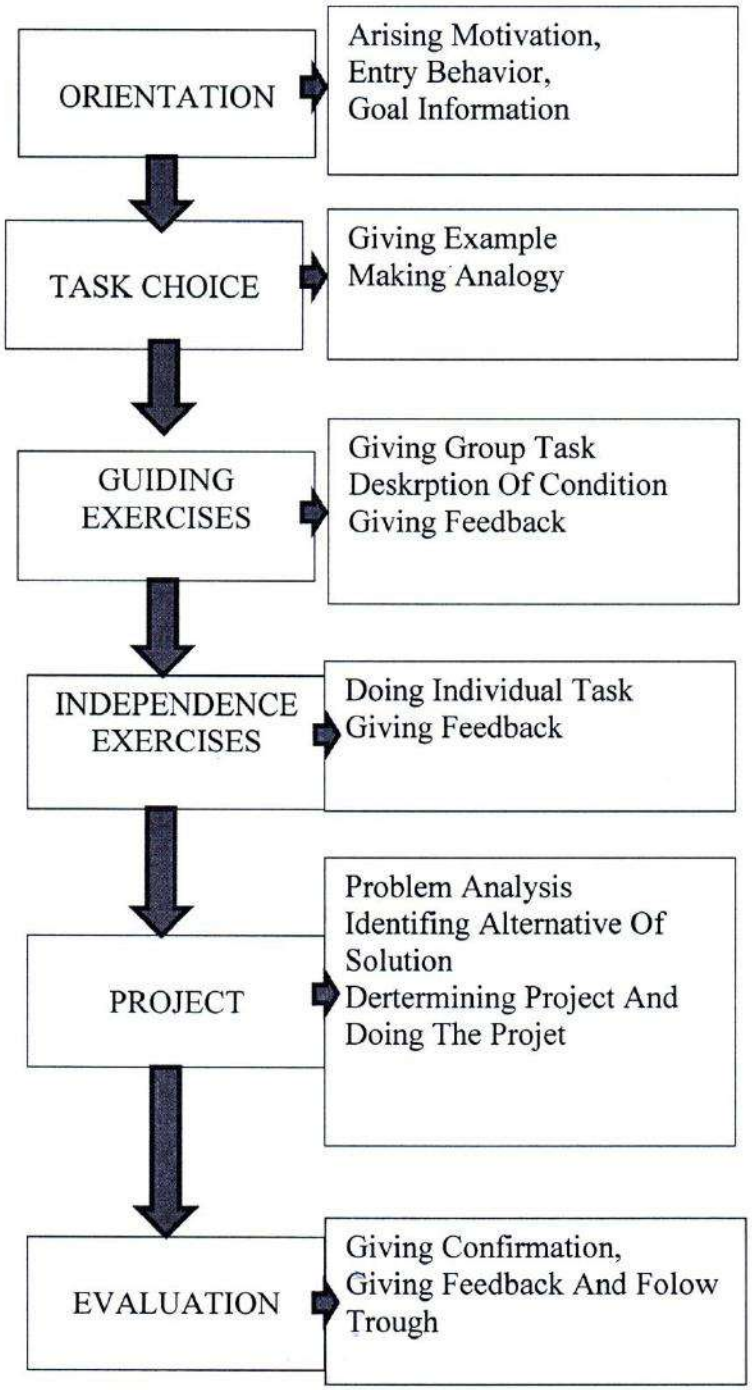

Picture. 2. Draft Welding Engineering Learning Model Based on KKNI to Improve Soft Skills.

V. CONCLUSIONS

The KKNI-based welding technique learning model to improve the *soft skills* that have been produced as the initial product is a hypothetical model that has six main components1) Orientation, including motivation building activities, reviewing the initial ability to explain goals, 2) Choosing assignments, including activity description conditions and analogies , 3) Guided training, including activities to provide Examples, Group Tasks, and Feedback, 4) Independent training, covering individual task activities and feedback, and 5) Projects, including problem analysis activities, alternative solutions, determining projects, completing projects, and

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6) Evaluation includes confirmation activities, feedback, and follow-up.

Improvement of students' soft skills is 23.05%. as a result of the implementation of the OSGIPE learning model.

Therefore, it can be concluded that

The OSGIPE learning model is feasible and effective for improving soft skills of vocational high school technology students, especially in welding learning.

Implications

Based on these conclusions it has the following implications:

1. Summative evaluation procedures need to be carried out through the identification of existing learning techniques of welding techniques developed by other parties.
2. Dissemination and outreach needs to be done to vocational high school technology teachers

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Nano-approach towards Sustainable Agriculture and Precision Farming

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Abstract—Nanotechnology is a most fascinating area of research now a days. The unique physicochemical properties of nanomaterials, that is, catalytic reactivity, high surface area, size and shape, have the potential to open new paradigms and to introduce new strategies in agriculture. Specific agronomic applications of nanotechnology include enabled delivery systems of release of agrochemicals allowing a controlled release of fertilizers, pesticides and herbicides, field-sensing systems to monitor the environmental stresses and crop conditions and improvement of plant traits against environmental stress and diseases. In the present review, a brief introduction about the recent nano-innovations in agriculture is introduced. This will paves the way to further investigations in this regard.

***Keywords*— Nanotechnology, Agriculture, Smart-Dust Technology.**

I. INTRODUCTION

Man has learnt a lot from nature. Yet the manufacturing practices are primitive. Everyone knows that a lot more needs to be done to get closer to the nature. But definitely, Nature is a teacher of human for example, to create nanobots we go through the Bacterium flagellar motion, so that the nanobot can move inside the body fluids in a frequent manner. Pulse protein called Forisome can be utilized to create nanomotor. Nanosensors can be produced that have sensing power like ear, eyes and nose but not better than sensory organs of animals. Nanocomposites, nanomaterials etc. have emence functional applications.

What is Nanotechnology?

Nanotechnology is considered as an 'Umbrella' term as it blurs the boundaries between physics, chemistry and biology sciences (Dravid, 2004). It is a new area of science that involves working with materials and devices that are at the nanoscale level. A nanometer is a billionth of a meter that is about 1/80,000 of diameter of a human hair, or ten times the diameter of a hydrogen atom. It manipulates the chemical and physical properties of a substance at molecular level. Nanotechnology term was first coined by Norio Taniguchi in 1974. In 1980, Dr. K. Eric Drexier promoted technological significance of nanoscale phenomenon and devices (Pradeep, 2007).

Nanodimension is the range larger than an atom but smaller than a viral, bacterial or animal cell. The basic idea of nanoparticles formation is the Quantum confinement (Sastry, 2002). This means keeping the electrons trapped within a small area. Due to this, nanoparticles may have unusual physicochemical & opto-electronic properties so discrete kind of functionality is expected. Nanoparticles are singly so important but in aggregated form they have tremendous functional applications that are recognized today. Nanoparticles aggregate to form some specific structures called Nanostructures. The widely used nanostructures are: Fullerenes, carbon nanotubes, dendrimers, quantum dots, nanoshells etc. The advanced nanotechnology involves the use of nanosensors, nanorobots, nanobodies, nanodevices etc. These materials have direct applications in each & every field of science i.e. chemical, physical, biological, environmental or other sciences.

Nanotechnology has the potential to revolutionize the agricultural and food industry with novel tools for the molecular management of diseases, rapid disease detection, enhancing the ability of plants to absorb nutrients and others. On the other hand, nanobiotechnology can improve our understanding of the biology of various crops and thus can potentially enhance yields or nutritional values, as well as developing improved systems for monitoring environmental conditions and enhancing the ability of plants to absorb nutrients or pesticides.

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II. SUSTAINABLE AGRICULTURE AND PRECISION FARMING: NEED AND IMPORTANCE

The world agriculture is facing many challenges like changing climate, urbanization, sustainable use of natural resources and environmental issues like running off and accumulation of pesticides and fertilizers. These problems are further intensified by an alarming increase in food demand that will be needed to feed an estimated population of 6-9 billion by 2050. As fossil fuel resources are declining and industrial agriculture becomes increasingly inadequate, researchers are looking for new technologies to maintain high levels of food production (Siddiqui et.al, 2015).

III. NANO-APPLICATIONS IN AGRICULTURE AND PRECISION FARMING

Applications of nanotechnology in materials sciences and biomass conversion technologies applied in agriculture are the basis of providing food, feed, fiber, fire and fuels. In future, demand for the food will increase tremendously, while the natural resources such as land, water and soil fertility are limited. The cost of production inputs like chemical fertilizers and pesticides is expected to increase at an alarming rate due to limited reserves of fuel like natural gas and petroleum. In order to overcome these constraints, the precision farming is a better option to reduce production costs and to maximize the output, i.e., agricultural production (Siddiqui et.al, 2015).

3.1. Smart field systems

This is another interesting application of nanotechnology in the agricultural field. Smart field system also based on the use of the nanosensors by which a field is created that automatically detects, locates, reports and applies water, fertilizers and pesticides to the infected area. This methodology is currently working in the USA.

3.2. Smart dust' technology

This is an idea that thousands of tiny sensors could be scattered like invisible eyes, ears and noses across the farm fields and battle fields. Firstly, Kris Pister has developed autonomous nanosensors that are in the size of a match-stick head. Using silicon-etching technology, these 'motes' or (smart dust sensors) would feature onboard power supply, computational abilities and the ability to detect and then communicate with the other motes in the vicinity. In this way, the individual motes would self organize into computer networks and capable of relaying data using wireless technology.

The new radio telescope of the LOFAR (Low Frequency Array) project is based on tens of thousands of antennas that are connected to each other with a large ICT infrastructure. LOFAR Agro will make use of this infrastructure and has chosen as its first application the measurement of the micro-climate in potato crops. This information will be used to improve the advice on how to combat phytophthora within a crop, based on the circumstances within each individual field. So the system that provides the integration of smart system, sensing, localization, reporting and remote control can increase the efficiency and security (Scott and Chen, 2002). Nanotechnology in the fields operates at same scale as a virus or any other disease infecting particle infects the plant.

So, it holds the potential for very early detection and eradication like a bio-analytical nanosensors that could detect a single virus particle long before the virus multiplies and before the symptoms develop in the animals and in the plants (Drexier, 1986).

3.3. Bioanalytical nanosensors

These nanosensors are used to detect the pathogens, contaminants, environmental characters (light/dark, hot/cold, wet/dry) and particulates or allergens and heavy metals. These are small, portable, rapid response and processing speed, specific, quantitative, reliable, accurate, reproducible, robust and stable (Scott and Chen, 2002). One of the autonomous sensors for real time monitoring is the 'GPS system'. These nanosensors could be distributed throughout the field, where they can monitor the soil conditions, crop growth etc. These are widely used in the certain parts of USA and Australia. In agriculture and food systems, the new tools for the separation, identification and quantification of the individual molecules are developed.

However, this area needs various research to be explored such as nanobioreactor development is needed for the study of enzymatic processes, microbial kinetics, molecular ecology, mixed enzymes system and rapid assessment of response to the environmental factors (Scott and Chen, 2002).

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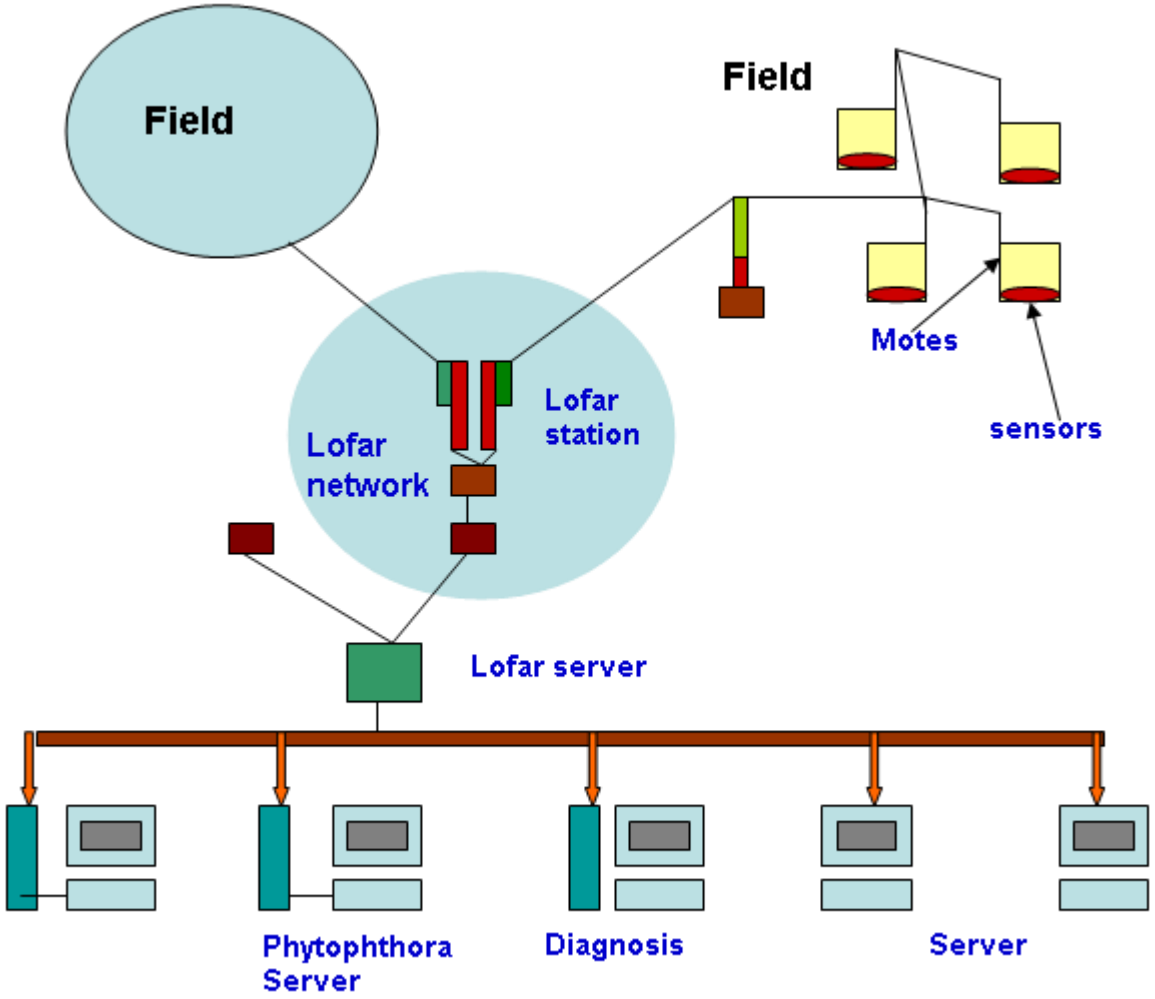

Network showing the smart dust technology in the field to detect the Phytophora

Nanotechnologies	***Examples***	***Potential applications***
Energy storage, production and conversion	Novel hydrogen storage based on carbon nanotubes, photovoltaic cells and organic light emitting devices based on quantum dots.	This provides cheaper, clean, low cost solar cells and improved rechargeable batteries.
Agricultural productivity and enhancement	Nanoporous Zeolites for slow release and efficient delivery of the water and fertilizers for plants, nanocapsules for herbicide delivery, nanosensors for soil quality and plant health monitoring.	These provide more efficient and sustainable food production that requires fewer inputs.
Food processing and storage	Nanocomposites used in plastic films for food packaging, antimicrobial nanoemulsion for decontamination of the food, nanotech based Ag detection of the contaminants.	Provide cheaper and safer food products with stronger life.
Vector and pest detection and control	Nanosensors for pests detection and control.	More rapid and safer control strategies with reduced loss.

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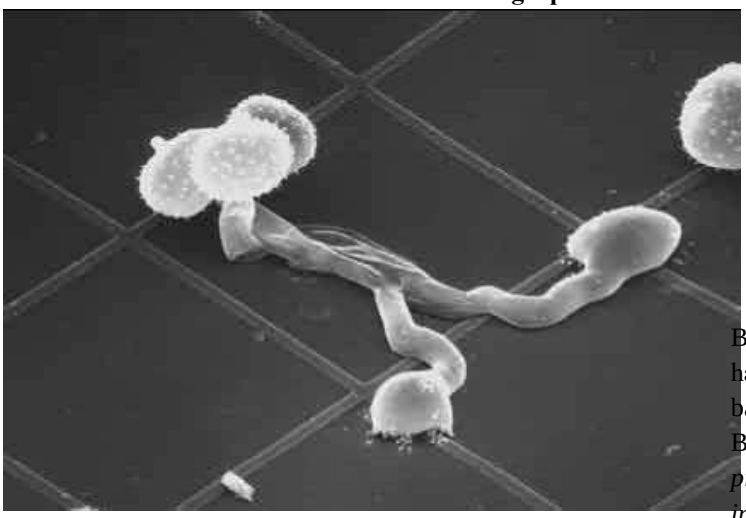
3.4. Plants diseases Management

Tracing the path of plant pathogen – a new revolution in plant disease management

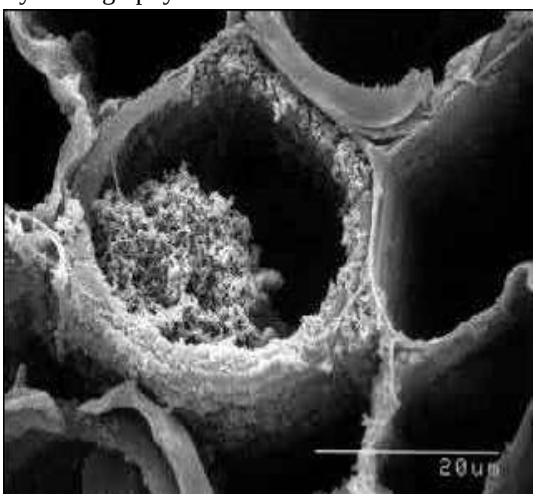
Fungus on the artificial leaf surface

Researchers are using the nanolithography (Fabrication technique) to fabricate the topographical surfaces that mimic leaf surface on which a particular pathogen can grow. They also trace the path and mechanism by which the pathogen invade and colonize inside the leaf. They use the imaging techniques like SEM (Scanning electron microscopy) and show how bacteria and fungi feel their way around the plant world. Hoch and his colleagues studied three diseases and trace the path of their causal organisms by the help of 'Nanolithography'. These diseases are **'Rust of beans', 'Anthracnose in corn' and 'Pierce disease of grapes'.**



Rust disease in beans is caused by the *Uromyces appendiculatus*. Hoch and his team simulated the leaf topography by micro fabricating ridges on the silicon wafers using electron beam lithography (Mccandless, 2005). Then images of growing fungus are taken by the SEM. These images showed that the fungus crawls across the ridges until it senses a correct topographical feature that actually mimicking the 'stomata'. When this fungus finds the artificially made stomata like pores on the artificial leaf surface, then it develops the primary infection structure called 'Appressorium' and invade in the leaf tissue. The images and their further analysis show that ridges are 0.5 µm high and this dimension is sufficient for the production of infectious appressorium. This information may be utilized in future to develop the plants with the stomatal aperture lower than 0.5 µm. This can be done by manipulating the genes in the plant genome responsible for the stomatal aperture size. These changes can make the more rust resistant plants.

Infact, research work on this thought has already been started by Burr and his colleagues in the management of the pierce disease of grapes that is caused by the bacteria *Xyllela fasidiosa* that moves upwards against the flow of sap in the plant xylem vessels and blocks them. The reasearchers have fabricated the micro fluidic chambers to mimic the plant xylem vessels. They have created the artificial xylem vessels using a silicon elastomer that was replicates from silicon wafers on to which the 'master' pattern were constructed with phytolithography.



By SEM imaging, it was found that the bacteria have tiny hair like structures called 'pilli' that was responsible for bacteria attachment to the xylem walls. By this information, Burr and his workers *interrupts the genes responsible for the pilli formation and thus this mutant bacteria is now unable to infect and block the xylem vessels* (Mccandless, 2005).

3.5. Nanoparticles involved Gene therapy for plants

Nanoparticles involved Gene therapy for plants – improving plant genetic characters

Nanoparticles are used for incorporating foreign DNA into the cells. For this purpose, carbon nanofibres are prepared from a silicon chip and artificially synthesized DNA strands attached to the nanofibres (McKnight, 2003). These loaded carbon nanofibres are then injected inside the plant cell and expresses inside the cell to synthesize a new protein and a new desired trait. This artificial DNA will remains attached to the carbon nanofibres and thus not transferred to the next generation. This technique enables the researchers to selectively switch on and off a key trait such as fertility. Moreover, mesoporous silica nanoparticles are used to transfer the foreign DNA inside the plant cell that uses a biolistic gun approach (Torney et. al, 2007). Not only DNA, but also RNA, small peptides and other materials can be

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successfully injected inside the plant cell, through this approach. With the mesoporous nanoparticles, we can deliver two biogenic species at the same time.

A gene can be induce in a controlled manner at the same time and at the same location. The biologists successfully used this technology to introduce DNA and chemicals to Arabidopsis, tobacco and corn plants.

These findings reveal the bright future aspects in the improvement of crop science. So by changes any unwanted gene and incorporating a desired gene through the nanoparticles, we can improve or install our desired character in the plant cell.

3.6. Atomically modified seeds

Seed characters can be improved by nanobiotechnology and the changed seeds are called as 'Atomically modified seeds'. These modified seeds are produced by drilling a hole through the membrane of rice cell and insert a nitrogen atom inside the cell. This foreign N atom stimulates the rearrangement of the rice DNA. By using this technique, rice variety colour is changed from purple to green. So this will help in changing the unwanted characters of the plants.

3.7. Nanocides : pesticides via. Encapsulation

Nanocides: pesticides via. encapsulation

The pesticides containing nano-scale active ingredients used for crop protection and disease management are called nanocides. Nanoparticles of about 10-150 nm size are used as an active ingredients in the pesticides. The advantage of using these nanoformulations is that the pesticides dissolve more readily in the water and can be simply applied over the crops. These are more stable and have high killing capacity.

Nanocapsular formulation of the pesticides

Formulation of the nanoscale pesticides involves encapsulation or packaging of the nanoscale active ingredients within a kind of tiny envelope or shell. This type of formulation reduces the contact of the active ingredients with agricultural workers and may have environmental advantages such as reducing run-off rates.

Different nanocides available in the market

Companies	**Nanocidal product**	**Characters of the product**
BASF, Germany (world largest chemical company)	Nanoparticles as an active ingredients in pesticides	Nanocide can be easily dissolved in the water and controls pests and herbs.
Bayers Crop Science, Germany (world second largest pesticide firm)	Microemulsion concentrates	More rapid, reliable and longterm activity against pests.
Sygenta (world largest agrochemical corporation)	Primo MAXX plant growth regulator	These are oil based pesticides mixed with water and then heated to create an emulsion.

It consists of about 50 trillion capsules that are designed to be 'quick release' and breaks open in contact with the leaf of the plant. These capsules strongly adhere to the leaf so cannot be easily washed by the rain. The outer shell of these capsules opened only under special conditions example – 'Gutbuster' microcapsules breaks open in an alkaline environment such as stomach of certain insects. There are several benefits of using such nanocapsules like – these nanocapsules have long lasting biological activity, less soil binding for better control of the pests, reduce workers exposure, reduce damage to the crops, less effect on other species, less pesticides loss by evaporation, prevents degradation of the active ingredients by sunlight etc.

3.8. Photocatalysis using nanoparticles

Photocatalysis is a reaction in which chemical compounds react in the presence of the light and itself is not being completely consumed in the reaction. In the presence of the UV light, the valance electrons in the nanoparticles are excited to form electron hole pairs. These negatively charged electrons and positive holes are the strong oxidizers. When harmful substances like pesticides stick to the positively charged holes, they are disintegrated into the harmless compound. The excited electrons are also injected in bacteria in contact of the nanoparticles and hence act as disinfectant and find application in fruit packaging and food engineering (Blake, 1997). Metal oxides uch as TiO_2 (Bhatkhande et. al, 2001), ZnO (Li and Haneda, 2003), SnO_2 (Cao et. al, 2002) etc. as well as sulphides such as ZnS (Torres-Martinez et. al, 1999) have been used for photocatalysis. These nanoparticles

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have efficient disinfectant rates and are used to degrade the harmful pesticides that take long time in the decomposition.

3.9. Nanobarcode Technology

Nanobarcodes (Nice-Warner et. al, 2001) particles are encodeable, machine readable, durable, sub-micron sized taggants. They are free standing, cylindrically shaped metal nanoparticles having dimensions of 20-500 nm in diameter and 0.04-15 nm in length. The particles are manufactured in a semiautomated process by electroplating the inert metals (gold, silver) into templates defining particle diameter and then releasing the resulting striped nano-rods from the templates. These nanobarcodes are especially used for robust, uniquely identifiable nanoscale tagging of small items for authentication or tracking in the agricultural food and husbandary products.

IV. CONCLUSION AND FUTURE PROSPECTS (2)

Nanobiotechnology advances in Agriculture and Food Development

Nanobiotechnology, as a new versatile branch of nanotechnology, has the potential to revolutionize the agricultural science by providing new tools for agricultural development**.** Molecular treatment of the disease, rapid disease detection, enhancing ability of plants to absorbs nutrients, smart sensors, and smart delivery system will help the agricultural industry to combat viruses and other crop pathogens. Not only these, but there are several fields of agriculture where nanotechnology has shown its impact. Some of them are –

1. Precision farming 2. Smart dust technology 3. Nanotechnology in cell and molecular biology aspects of plants 4. Smart treatment delivery system 5. Agricultural waste treatment

However, these are so much expensive methods and are not currently being used in the developing countries. But most probably in near future, there are chances of the successful implementation of nanoscale devices in agriculture.

1. Precision farming – This is also called as '*site specific management'*. It defines the unification of the information technology with the biology. Precision farming means growing crops in hundred percent efficient manner. Precision farming has a goal to maximize output (crop yield) and minimizing input (fertilizers, pesticides and herbicides etc.) through monitoring environmental variables and applying targeted action (Hummel et. al, 2000). This technique make use of the computers, global satellite positioning systems and remote sensing devices to measure highly localized environmental conditions thus determining whether crops are growing at maximum efficiency or precisely identifying the nature and location of problematic area. This information helps the farmer to keep the crops safe from infection (Birrell and Hummel, 1997).

The remote sensing nanodevice that is used here is the *'Nanosensors'*. An interesting futuristic example of precision farming is given that a farmer while doing his household work gets information on his computer that a fungus is growing in north region of his field and penetrates about 0.2 feet in the soil. The farmer then goes to that particular region and applies suitable fungicides in that region only, so that disease gets cured before the macro symptoms would appear. This seems to be a dream but is going to be true by nanobiotechnology. Moreover, in USA this methodology is working currently.

Benefits of precision farming –

a. Precision farming promises higher yields and lower input costs by streamlining agricultural management and thereby reducing the waste and labour costs.

b. It also offers the potential to employ less skilled and cheaper farm machinery operators. Such systems can simplify and centralize decision making (Joseph and Morrison, 2006).

c. By pre-sensing the pathogens and infections, it is possible to eliminate the pathogens before the macro symptoms have appeared.

d. In the future, precision farming will resemble robotic farming as farm machinery is designed to operate autonomously, continuously adapting to incoming data.

Role of networks or wireless sensors in precision farming - Wireless sensors are scattered on the fields and are interconnected via. a computer network system. These networked sensors are expected to provide detailed data on the crop and soil conditions. This system gives information in real time to remote location of abnormal reaction going on the field. Since many of the conditions that a farmer may want to monitor (for example- the presence of plant viruses, level of the soil nutrients, drought conditions etc.) for his safety of the crop can be easily predicted by operating this devices at the nanoscale.

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Bioanalytical nanosensors

Applications of nanotechnology in the agricultural field (Persad et. al, 2005)

Nanotechnologies	***Examples***	***Potential applications***
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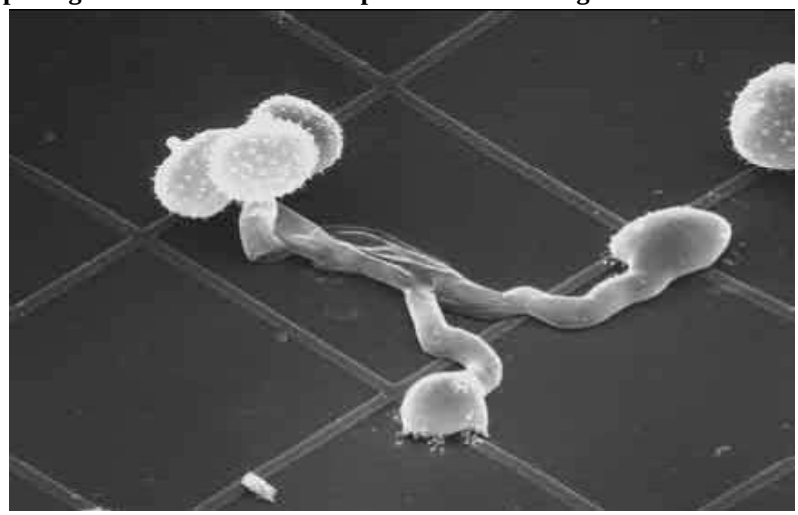
Tracing the path of plant pathogen – a new revolution in plant disease management



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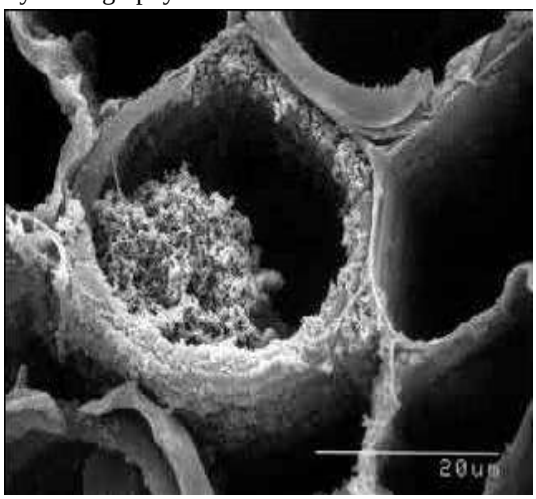

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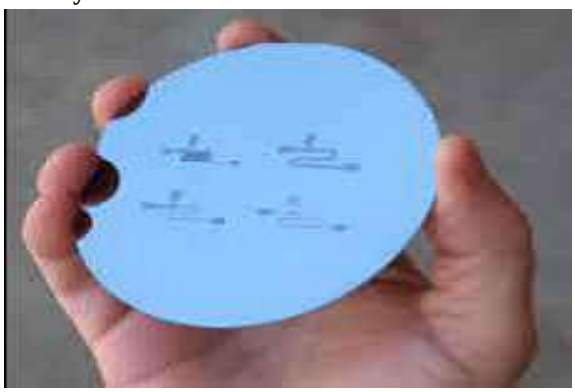
Blocked xylem vessels



Master patterns used to produce artificial xylem vessels

This is the wonderful approach that can be used in management of several disease in the plants. Plant pathogens due to extremely small size can not be traced with any other technique, only this nanolithography enables the researchers to closely monitor the secret path of pathogen for infecting the plants.

Nanolithographical manipulations results in disease management

Disease	Pathogen	Mode of entry	Nanofabrication	Management
Rust of beans	*Uromyces appendicuata*	Through stomata	Artificial leaf surface through nanolithography	By developing plants that have stomata size less than 0.5µm
Anthracnose in corn	*Colletotrichum graminicola*	Through leaf surface (any where)	Nanofabrication of the pillared surface on silicon wafers	By developing plants that are less sensitive to fungal infections
Pierce disease of grapes	*Xyllela fasidiosa*	Through xylem vessels	Artificial xylem vessels by photolithography	By interrupting the gene for pilli formation in the bacteria

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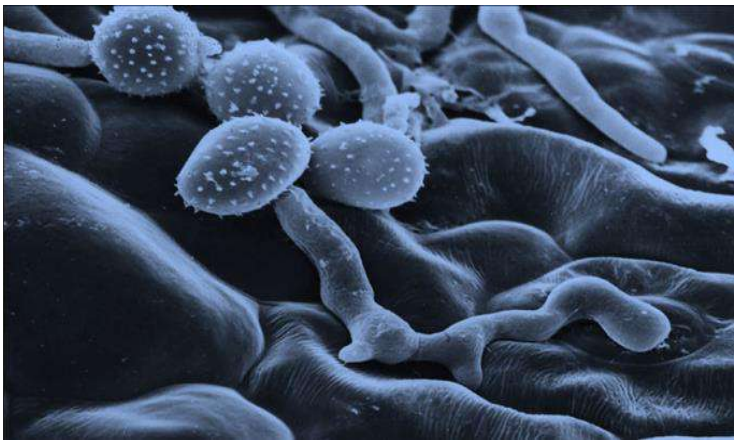

Rust fungus growing on the artificial leaf surface

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The mediating effect of the information systems use on the relationship between Economic Intelligence and organizational performance

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Abstract— *In recent years, research work has increasingly taken a new direction, allowing the analysis of certain intangible factors, in particular information and economic intelligence.*
On the other hand, at the strategic level, economic information management has become one of the essential drivers of the global performance of companies and nations.
To keep abreast of changes, and to contribute to theoretical and practical debates, through our contribution we will try to analyze the relationships which exists between the economic intelligence practices and performance, and then propose a conceptual framework
Keywords*— *Economic Intelligence, Performance, Firm Culture.

I. INTRODUCTION

In a highly fluctuating world, complex, and shaped by the information. The current competition is without precedent, where it is essential to demonstrate competitiveness, proactivity and permanent vigilance for a better development of the company,

In fact, successful organizations depends on their ability to provide relevant information,

And given the information which the Organization have needs must be reliable, Economic intelligence is susceptible to have an impact on the performance of The Company (S.Habhab, 2007);

Thus, despite the role that Economic intelligence practices can play in achieving better performance, some research has addressed this relationship.

In this order of ideas that this communication will attempt to put the light on the work who treated the relationship which exists between the practices of the economic intelligence and performance while trying to then propose a conceptual model.

II. REVIEW OF RELATED: LITERATURE REVIEW

A. Conceptual Review: Economic intelligence

As for many concepts in management science, the definition of the IE poses theoretical debates but also practices.

The authors use, in effect, definitions diverse and varied to designate this practice; each stressing the different characteristics of this activity,

In effect the economic intelligence is more than an activity of supervising environment, and it distinguished from the economic espionage, by the fact of being a responsible attitude to protect the information and the company against the threats and vulnerabilities (S. Habhab2007)

According to A.Juillet (2003); The economic intelligence is the set of actions coordinated research, treatment and distribution in view of its exploitation, useful information to the economic actors, these various actions are conducted legally with all the safeguards for the protection of the necessary for the protection of the Heritage;

This definition puts the emphasis on other dimensions very essential: the protection of the heritage and the information cycle.

According to the Martre report (1994); "Economic intelligence is defined as the set of coordinated research, processing and distribution of information useful to economic actors, so economic intelligence is a public policy of competitiveness, economic security, and influence, (Carayon 1993),

In fact, most of the definitions of the economic intelligence list a number of dimensions all constituents of the practices of the economic intelligence,

Most of the definitions proposed in the literature tend to

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describe the activity of IE from three dimensions aimed at the improvement of the decision-making: The Monitoring Environment (In French Veille), the protection of the Heritage informational and the influence (Paturel and Richomme-Huet, 2010).

1) Monitoring environment:

Monitoring environment is considered as the first and most well-known of the functions of the economic intelligence (Laghzaoui 2016),is defined as a continuous activity and largely iterative aimed at active monitoring of the technological environment, competitive, etc. …; to anticipate developments; it is a cyclical business and processual in function of informational flows 'standard[1] ;

Therefore Monitoring environment is a set of facts transforms the information obtained from different sources for the benefit of a user ,according to Martinet and Ribault (1988), Monitoring and watch environment as organized attitude of listening to the signals from the environment of the company likely to put in because of strategic options, these elements refer finally to an organized collection of the information available in the environment The Organization Coutenceau (2012) cited in Laghzaoui ;(2016), says that the management of the information passes by several operations called 'Information cycle.

2) The protection of the tangible and intangible heritage:

Is the fact to put in place measures to protect the intangible capital of the organization; it aims to protect the intangible and tangible heritage and of the company and everything that could confer a competitive advantage (Breillat, 2010; Paturel and R.Huet, 2010).

The protection function can cover the following aspects: information safety and security, counterintelligence, rumour fighting, patenting, etc. (Larivet, 2009)[2].

3) The influence:

Influence is the Diamond point of Economic Intelligence; it is the act of building consent and configuring specific contexts so that the rival or ally makes decisions in the interests of the influencer.

The influence function is to implement a series of direct pressures and/or indirect effects on influential actors in the sector. The objective is to force the maintenance or development of a competitive position (Boumard, 2000).

Two natures of influence can be identified:

- Lobbying: This practice aims to influence external stakeholders in order to serve the company's interests (Jakobiak, 2009).

In doing so, a company can carry out interventions to guide the development process, based on the application or interpretation of legislative, normative and regulatory measures and, more generally, any intervention or decision by public authorities (Larivet, 2009)- The Management of Competitive signals: this strategy of influence in competitive field consists of the sending of deliberate signals in order to influence a competitor and persuade them to modify its positions (Marcon and Moinet, 2011).

B. Conceptual Review: the firm's organizational performance

C. Batz and Haltin define organizational performance 'the performance of a multi-dimensional structure of the variables it depends on several factors; they also suggest that goal setting, evaluation assessment and behavior of performance result is much more important'

Firms performance measurement can be divided into two components namely Financial Performance (Kapal and Nortan,2011) and non-financial performance, wish respectively evaluates firms monetary and non-monetary dimensions,(Daly;Okumus,2011).

1) The Financial Performance:

Financial performance reflects the Firms financial situation which can be evaluated using indicators such margin profile, return on assets (ROA),returns on sales (ROS),return on investment (King)and others(Tee et al,2010)

The evaluation of the financial performance of a business is done through its financial ratios.

Over the past three decades, empirical studies have been carried out to prove the usefulness of these ratios (Chen and Shimerda, 1981). In effect, these are required to analyze the

financial health of a business to know: the profitability, liquidity, the estimate of the benefit future, the analysis of the competition and the prediction of the bankruptcy of the companies (Zeller et al. ,1996,cited in Z.Samlal 2016).

[1]Defined by AFNOR (standard XP X 50-053, April (1998).

[2] LAGHZAOUI,S ;International Commitment and practices of economic intelligence: the case of th exporting SMES Moroccan ;13e Congrès International Francophone entrepreneurship and SMES CIFEPME Octobre 2016

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2) The Non-Financial performance:

Non-financial measures inherently focus on the long-term achievement of firms by concentrating on customs gratification internal business process,

Productivity, invention, and employee fulfillment (Avci et al;,2011),So according to (Zigan and Zegglat(2010) ,Customer satisfaction and loyalty were also found to be the core components firms non-financial performance:

D. Empirical Review: Economic intelligence & Firm Performance:

The importance and the usefulness of the economic intelligence within the companies are no longer to demonstrate in a world very fluctuating, we can say that the achievement of a better performance is even the central objective of the economic intelligence;

The management of the economic information has become, one of the essential motors of the overall performance of economic agents.

Economic Intelligence lead targeting of the organization and shows the competition positions and makes the company to be able for forecasting and developing their markets through analyzing the behavior of the competitions and environment to identify opportunities that in long run will lead to innovation (Britt, 2006).

Companies with using Economic Intelligence and analysis of competitor's strengths and weaknesses can predict opportunities of market development and having better performance rather than competitors (Cobb, 2003).

Therefore, performance results à process seen as a strategically important, condition for the survival of any organization intertying to improve their performance in terms of profitability (Antoncic and Hisrich, 2000).

F.Jakobiak (1998), has noticed the difference in performance between firms depending on the location and the use of system of monitoring environment, it has concluded that the most successful companies are those equipped with systems of supervising environment.

According to C.Cohen(2007), the economic intelligence has for main missions to propose and carry out actions,in the aim of helping the strategic decision making,to improve the competitiveness and performance of the Organization.

Economic Intelligence practices can be a source of sustainable competitive advantage by enabling a firm to develop, implement and monitor strategies that create as well as protect shareholders value in the long term (Protiviti,2011);

So competitive intelligence practices can make to measurable impact on the firm performance by a proactive manner to enhancing business performance;

In fact, according to several researchers and specialists (Peters, Waterman,1993),the ability of an enterprise to monitor its environment can explain a large part of its capacity and its performance.

Indeed, the VASIC study showed that monitoring activities explain the variance in the company's performance in terms of environmental control capabilities.

The Audet study (2003), which focused on the innovative SME has for the purpose of verifying the existence of relationship between the intensity of standby, the integration of the information in the strategic process in order to establish if this relationship has an impact on the performance of SMES studied, the results show that the leaders of the most performing SME's have a strong propensity to innovation.

Bournois and Romany have made a study on 1200 French companies, after these authors the fact to practice or not to practice economic intelligence is linked directly or indirectly to the economic performance, they have in fact put in relation economic intelligence practices and financial performance.

The study conducted by S. Habhab (2007) on high-tech SMEs shows that the most efficient SMEs are distinguished from the least efficient by information sharing.

Stubbart 1982, in his study emphasizes that there is a direct link between performance and intelligence, however, in several cases the association may be negative, the fact that performance problems cause a change toward a regular monitoring.

In the same sense of idea in 1999 Kaish and Gilad find a decline in activity of the supervising when SMES reach a experience and a sufficient profitability, because according to them the leaders, when they focus on the internal management they negligent the search for new opportunities for that they reach a satisfactory level of performance .

Shakoori,Alvedari,and Mosafri (2014),cited in (Hope N.Nzewi and al..;2016) conducted a research in selected banks in Iran on the role of competitive intelligence in moving customers towards high level loyalty; They finding revaluated that among component of high level loyalty, trust, affection, satisfaction, value, brand value and resistance to change have more importance in direction, customers towards an ideal loyalty and making ambassadors for bank

Phani, Madhumita, and Paurav,(2011) conducted research in India on the impact of Competitive intelligence practices on the firm’s performance in the emerging market of India;

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Their finding revealed that Indian firms exhibit higher levels of competitive intelligence practices indeed achieve better financial performance result (Hope N .Nzewi and al..;2016).

III. ELEMENTS OF PROBLEMATIC AND THE RESEARCH HYPOTHESIS:

A. *Problem of research:*

The literature review on the practices and the dimensions of the economic intelligence also on the links that exist between the practices of the economic intelligence and the performance of the company on the other side, has made initialed certain questions that deserve a reflection and a deepening, the fact that the studies which have treated the relationship between performance and the practices of the economic intelligence are somewhat limited by the fact that they do not specify the indicators(S.Habhab2007) ;

So, the work focused on the nature of the link that exists between performance and economic intelligence does not concern the public companies, these reasons and other lead us to ask the question:

What characteristic of practices of economic intelligence are having the impact of the organizational performance of Moroccan public institutions and companies?

B. *A conceptual Framework: conceptual model*

In order to build our conceptual model, we had to articulate a vision based on the theoretical and empirical studies conducted on the practice of the economic intelligence and its impact on the firm performance.

As well, the conceptual model that we are going to present bringing together the dimensions of (EI) and those of the performance of the company.

And we assume that the dimensions of the practice of (EI) have a significant impact on the organizational performance of the company.

According to Levet[3]:"In its global approach, economic intelligence isis based on information literacy and the production of
new knowledge. »

the emergence of new technologies has radically changed transformed the way organizations operate.

In this case, the transition period, information systems appears a solution that can guarantee a competitive advantage[4]

And the Information systems, through their technical performance and transversal ramifications, can radically accelerate the development of economic for companies.

In fine,the information system has a strategic role in organizations, its degree of quality and efficiency is considered very important in the speed and accuracy of decision making.

and according to M. BAROTthe quality of an information system is four-fold, namely relevance, speed, reliability and confidentiality,

As a result, the research model developed as part of this research (Figure No. 1) postulates that the dimensions of (EI) practice (Monitoring Environment; Protection, Influence), have an impact on the information systems use and that the latter influences the company's performance as well.

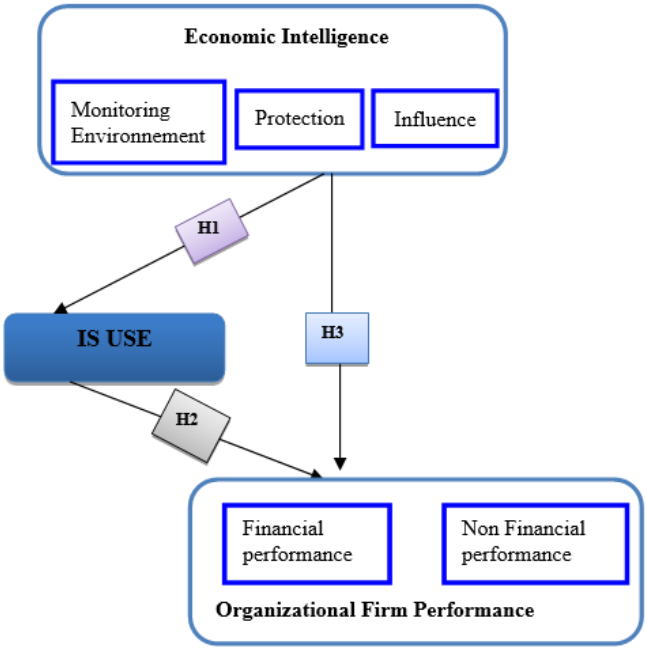

Fig.1: Research Framework

As well, practices of (EI), forming the block of independent variables (explanatory), include the dimensions and sub-dimensions:

- **Monitoring environment**, evaluated using the 4 under

[3] Président de l'Association française pour le développement de l'intelligence économique (AFDIE), in Levet Jean-Louis, L'intelligence économique, mode de pensée, mode d'action, Economica, 2001.

[4]Intelligence Économique Et Stratégique Les systèmes d'information au cœur de la démarche Rapports publiés par le Cigref en 2002-2003 :

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the dimensions of the information cycle: The expression of needs in information, the collection of information, the analysis of the information and tools for the dissemination of information.

- **Protection:** appreciated by the importance of this practice for the company. Two sub-dimensions are selected: the sensitivity to the security of information and the security measures adopted by the enterprise.

- **influence**, measured by the ability of influence of the company on its environment.

As to the organizational performance, representing the dependent variable (explain),

-**the financial performance** will be measured by: ROA(Return on assets);ROE(Return on Equity)and Tobin's Q, according to (E. Al-Matari et al..,2014) researchers revealed that the accounting based measurements like ROA, ROE, profit margin and others are used for the short-term performance of the firm while the market-based performance of the firm is gauged through Tobin's Q as a representation of future long-term performance. Therefore, the integration between the two provides a clear picture of the firm

-**the non-financial performance** will be measured by: customer satisfaction;

by report to the variable mediator who is the culture of sharing of information within the company it will be measured by:

Of this fact, and with the help of these different variables, two major assumptions will be tested.

-The first hypothesis

(H1) postulates that there is a positive link between the Economic Intelligence practices and the information system use in Moroccan public institutions and companies

This hypothesis is subdivided into three under hypothesis

H1-1: There is a positive link between the practice of Competitive intelligence in the Moroccan public institutions and companies, and the use of information system

H1-2: that there is a positive link between the protection in the Moroccan public institutions and companies and the information system use

H1-3: There is a positive link between the practice of the influence in the Moroccan public institutions and companies and the use of information system

The second hypothesis:

(H2): Postulates there is a positive link between the information system use and the dimensions of the financial and non-financial performance of the company.

(**H3):Economic Intelligence through information system use affects organizational firm performance.**

C. Research Methodology

We are adopting a mixed design (a qualitative and quantitative approaches) of descriptive and explanatory survey research. According to Sekaran and Bougie (2009)

A researcher should use more than one design to enhance the study; hence these two designs were used to achieve the optimal results as recommended by (Saunders, Lewis & Thornhill, 2009). Mixed methods can elicit insights that may be overlooked by a mono-method and can produce more complete knowledge contributions to theory and practice (Niglas, 2008)

It should specify the maturity of our research subject is not yet reached. To date, it is difficult to identify major robust empirical trends in Economic intelligence supporting hypotheses shared consensually by the scientific community. It is in this logic that we have opted for PLS Partial Least Squares as a choice of software because it is adapted to predictive causal analyzes in situations of high complexity and weak theoretical information (Jöreskog & Wold, 1982).

It is a nonlinear iterative procedure following partial least squares which minimizes the residual variances under a constraint of "fixed point" (Croutsche, 2009). We will therefore apply a second-generation, exploratory statistical method for modeling complex relationships between observed variables and unobserved variables.

The model chosen to confirm or reverse the assumptions made previously. We will seek to define the systems that constitute Economic intelligence practices and to identify its interactions with performance indicators. So, we will use the method of structural equation modeling (ESM).

Our methodological choice will test the relevance of a set of hypothetical relations through a mixture of exploratory factor analysis and multiple regression. It should be specified that the statistical verification of the hypotheses will be carried out through two types of analysis:

A) Exploratory Factorial Analysis

B) Confirmatory Factor Analysis

Target Population

The target population for this study were all the Public Moroccan companies. There are 92 companies. The study targeted the manager or directors in-charge of planning /strategy, and Information System Managers.

Objective of the study

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Is to determine the Mediating effect of information system use on the relationship between competitive intelligence practices and organizational performance of Moroccan public institutions and companies

IV. CONCLUSION

This article is a part of a Ph.D. program that aims to understand what impact of the practices of the economic intelligence on the performance of Moroccan public institutions and companies

. In other words, our doctoral research project will try to answer the following research questions: What importance is given to the practices of economic intelligence in Moroccan public enterprises and what is their impact on performance In order to answer our research questions, a qualitative research will be adopted. This research is appropriate in the sense that the aim of our investigation is to obtain a holistic and integrated understanding of how do Moroccan companies judge their practices of economic intelligence. Given the nature of the research questions and objectives, in depth semi-structured interviews will be selected as our research method. For that purpose, the dimensions of the framework proposed in this article will be transformed into observable and measurable elements. The objective of the empirical part of our research would be to present The characteristics of firms that practice economic intelligence and what impact their practices have on their organizational performance

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Survey on personality predication methods using AI

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Abstract**—** *In this paper we present a deep Literature Survey on Personality. Personality is a psychological concept intended to explain the broad range of human behaviors in terms of a few, consistent and observable individual characteristics. In this regard, any technology that includes knowing, predicting and synthesizing human nature is likely to gain from technologies to Personality Computing, i.e. technologies that can deal with human character.This paper is a study of these technologies and seeks to provide not just a strong knowledge and understanding on the state-of – the art, and also a conceptual model underlying the three main issues discussed in the literature, Electronic Recognition of Character(Inference from behavioral knowledge of an individual or group true character),Automatic recognition of identities(Personality inference other people attribute to an applicant based on observable actions) and Automatic combination of identities (Artificial personality production by means of embodied agents).*

Keywords**—Personality prediction, AI.**

I. INTRODUCTION

The growth of social networks is the result of social change, t he sharing of information, interaction and collaboration betw een changes. On the other hand, the role of social networks in everyday life is that, and the restoration of the network of real social relationships has affected even to a large extent. At the same time, due to the easy recording, acquisition and analysis of the behavior and status of social media networks, social computing has become an important research content in the field of computer science and computers.Because the behavior and personality of people are closely linked, there is a wide intellectual value and business prospects for making personality prediction. The results show that commercial personality and commodity selection are significantly correlated.Personality data can be used extensively in personalized recommendations for ads and merchandise [1], [2].Personality is a high degree of generalization of different characteristics of mankind, even in the same situation, different people will show different characteristics that come from each person's different personality.Personality psychology is one of the branches of psychology, mainly through the outward actions of individuals to discern and analyze the relation between the intrinsic characteristics of individuals [4].Normally, psychology uses personality traits to describe the personality of individuals, describing the actions and interests of the user [5].MBTI (Myers Briggs Type Indicator) and the big five personality model (openness, acceptability, conscientiousness, extraversion, and neuroticism) are widely used personality models. The behavior of the user's social network is closely related to his character traits. Hamburger et al. have been studying the relationship between user behavior and personality as early as 2000. Their research suggests that a correlation exists between both the personality of the user and the social services that they use. Between them, the outgoing personality is more inclined towards entertainment; the neurotic personality is less use of information services, and more popular social services [6]. [7] Used the usage habits of the keyboard and mouse to predict personality traits. Because social network user data can represent to a large extent their true personality traits, it is natural to use the social data of the user to predict personality. [9] Used the social data analysis of Facebook to assess that the extraversion and attention character had a huge positive relationship with the user's use of social network comfort. [10] By designing social networking apps on Facebook, encouraging users to participate in the big five personality test, using customer information as a data set to analyze, analysis found that the network size of the user does not reflect the social status and value of the user. To predict the relationship between user behavior and their personality traits, researchers use different research methods. Bai and others have recently released the

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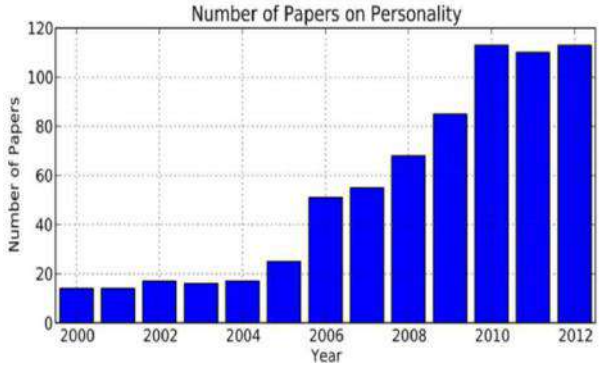
state update, using a variety of machine learning algorithms such as Naive Bayesian (NB), support vector machine (SVM) and decision tree, to predict the personality of 335 users online. The results indicate that the C4.5 decision tree algorithm can have the greatest predictive effect and verify that the machine learning algorithm can effectively predict the personality of social media network users [11]. Verhoeven B et al. used an integrated method to determine the personality of the user to resolve the issue of incomplete training data and integrated the data of various organizational forms with the integrated method and proved the validity by experiment [12]. Through the current academic results, we may find that there is some correlation between the social media network and the personality of the user, but the use of social networks to predict the personality of the survey results of the user is relatively small. On this basis, this report examines the Sina weibo, collects the user characteristics and personality characteristics of weibo users, defines the forecasting model, analyzes and predicts the personality of the weibo user, and checks the model's feasibility.



The chart reports the number of papers per year with the word “personality” in their title (sum over IEEE Explore and ACM Digital Library).

II. LITERATURE SURVEY

There is an increasing number of research papers in social networks linked to the actions of a consumer that has recently gained more interest in the international research community. Two key fields research the understanding of personality: computational linguistics and the evaluation of social networks. Pennebaker and King from the field of computational linguistics in 1999[14] published a pioneering work devoted to the retrieval of personality from text. In a variety of fields such as diaries, college writing tasks, and social psychology papers, they analyzed terms to analyze personality-related features with linguistic references. Their results show that pleasant people prefer to use more terms whereas introverts and low-consciousness people use more words to identify themselves. Neurotics are using more expressions of negative emotion. Argamon et al. 2005[15] identified neuroticism and extraversion using linguistic elements such as terms of action, expressions of judgment and assessment, and verbs of modality. Their findings showed that neuroticism is related to the use of functional lexical features, such as lexical taxonomy evaluation, whereas the results for extraversion were less evident. Many studies linked neuroticism to irrational beliefs or weak coping efforts on personality well-being [16] and Nowson 2006 categorized bloggers' extraversion, resilience, reliability, and conscientiousness using the Naive Bayes prediction model as a learning algorithm using various sets of n-grams as features. Mairesse et al. 2007[17] investigated correlations between the characteristics of the Big 5, using LIWC and RMC as feature sets. While LIWC features included word identification such as positive feelings or frustration, RMC features included word age results or word imageability results. Mairesse et al. developed a controlled program of personality identification using the corpus of essays written by Pennebaker and King in 1999. Of Social Network Research, there is an even short history of personality identification from network setup and other extra-linguistic signals. Gosling et al. studied the effect of the social interaction behavior of a user on personality [21]. They studied personality traits from self-reported use of Facebook and observable information on the profile. Rather than just emotional properties, all interface interfaces are based on statistical characteristics. Bacharach et al. [22] found that from their Facebook profiles, people can judge the personalities of others. Golbeck and so on. [23] Forecast the personality of 279 Facebook users using language features such as word count and social media site features such as counting friends. Orr and others, 2009 [24] showed a positive correlation between shyness and time spent online and a negative correlation with the number of friends. Sumner et al.[25] established the connection between the personalities of users and their use of Facebook, sharing material and emotion. Their result showed that transparency is positively associated with words that express negative feelings, rage, tabo subjects, income, religion, or death. Kalish and Robins [26] experimentally investigated the impact of behavior differences between individuals on their immediate network environment, focusing on ego networks consisting of a focal node or ego and the nodes to which the ego is directly connected (the so-called alters) and, if any, the connections between the alters. Their results indicated that the variability

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portions of egocentric network features can be clarified by psychological predispositions. Personality prediction based on vocabulary characteristics has been highly interested in prediction research [27]–[29], but from a network perspective, the role of links in supporting personality relationships is not yet well recognized.

Our research aims to investigate the existence of a social media structure and linguisticcharacteristics linked to personality experiences using the myPersonality project dataset [30].

III. DATASETS

We used the myPersonality dataset as a case study to analyze the personality traits of social media. We built the analysis fr om the myPersonality survey with 250 users and 9917status updates.Facebook users ' dataset was named in keeping with t he Big 5 template. According to the personality styles distrib ution in Table 3, multiple posts are collected in one folder by each client in the dataset [30].

❖ **TABLE:**

Distribution of Personality Traits

value	o	c	e	a	n
Yes	176	130	96	134	99
No	74	120	154	116	151

❖ **Note:-**

O, C, E, A, N applies to Facebook's distribution of perso nality ratings on the Big Five traits: openness, intelligenc e, extraversion, congeniality, and neuroticism.

We picked user information such as user social network layout, user profile, and text messages with some of the dataset. The final dataset contains the raw text Facebook status, author information, personality labels (scores and classes) and five user social media network metrics inferred by personality characteristics, i.e. network size, betweeness, distance, brokerage, and transitivity.

IV. DISCUSSION

Through the current academic findings, we can find that there is some connection between the social network and the personality of the user, but the use of social media sites tothe personality of the survey results of the user is relatively small. This paper examines the Sinaweibo on the basis of these, extracts the user's characteristics and personality characteristics of weibousers, develops the predictive model, examines and predicts the personality of the weibo user and verifies the feasibility of the model.

V. CONCLUSION

Based on the existing research, we focus on the characteristics of the social network and user behavior and set up three models for comparative analysis. We found that the behavioral characteristics of the user and their personality are related by studying social network data can effectively predict the personality characteristics of the user, which we can concentrate on the characteristics of social network and user activity on the basis of existing research, and set up three predictive models for comparative analysis. We found that, through the analysis of social network data, the behavioral characteristics of the user and their personality are related can be largely predictive of the personality characteristics of the user, which can urtherly facilitate the creation of customized applications. Use AI, more accurate framework for personality prediction can be built in the future.

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Perception of Vendors on Informal Lending Institutions

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Abstract*— *Informal lending is one of the Philippines ' most common sources of funding for households. The study described the perception of vendors towards informal lending in terms of cost, discretion, patience, humanity or sympathy, and reliability. Survey questionnaire was used in the study. The researcher used likert-scale type questionnaire and analyzed it through statistical data treatment such as mean and weighted mean.The findings of the study are as follows: in terms of cost, informal lending adds investment to business; in terms of discretion, informal lending greatly helps the business; in terms of patience, payment usually is given on the agreed date; in terms of sympathy or humanity, apology seems to be effective in not meeting the agreed date; and in terms of reliability, the ease of access to informal lending.

Keywords*— *Informal Lending, Perception, Cost, Patience, Sympathy or Humanity, Discretion, Business, Reliability.

I. INTRODUCTION

Informal lending is one of the Philippines ' most common sources of funding for households. In relation, Fuwa et al. (2015) stated that formal financial institutions are largely underdeveloped within developing economies and, as a result, informal lending serves as a significant medium for credit access.Mansuri (2007) further stated that informal lenders with market or capital exposure frequently find it attractive to assign loan provision to downstream lenders with a knowledge or compliance advantage when dealing with individual borrowers.

Zapata (2006) concluded that less trained, married and/or large-scale households are more likely to borrow from informal lenders. Ferrer (2017) enumerated that certain causes included diminished spouses ' ability to earn family income, poor home wealth and significant mortgage debt, inadequate ability to manage money and financial planning, and high incidence of illicit use of credit.

Dula and Grego (2017) concluded that although the characteristic of their company is informal, the supply of goods and services on the market and the local economy complements consumer activities.It is also important to understand as concluded by Floro (2017) the personal relationship between lenders and borrowers because it also has an influence on other markets, in addition to its effect on the credit transaction. Further, Römer (2017) found that results indicate that treatment group loan borrowers reported lower income, an impact more pronounced in the lowest percentile of income.

In Philippine rice-growing towns, rice merchants and farmer borrowers dominate the informal credit market as stated by Nagarajan et al. (1995).Thus, Briones (2007) concluded that informal lending reflects that borrowing responses should be a major concern in the implementation of finance cost recovery policies.

II. CONCEPTUAL FRAMEWORK

This research will be based on the study of Catherine Cross, Community Service Training Programme, University of Natal entitled on “Decision factors involved from a clear pattern. It is mentioned that community seems to evaluate potential lenders on five criteria which is cost, discretion, patience, sympathy or humanity, and reliability.” These factors will be the consideration to this study.

This research will help lending institution especially to the vendors of Cabanatuan City to determine the proper comprehension of informal lending and the problems to be encountered in solving using the factors. In this study they will know the advantages of borrowing in lending institution, and how it helps them.

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III. OBJECTIVE OF THE STUDY

The study describedthe perception of vendors on informal lending institutions be described in terms of: cost, discretion, patience, sympathy or humanity, and reliability.

IV. METHODOLOGY

The study used descriptive method as it describes the present condition. The main objective of the study is to explore the causes of particular phenomenon. It further concern with the condition or relationship that exists; practices that prevail; and beliefs and processes that are going on; effects that being felt or trends that are developing. (Cohen, Manion, Morrison, 2002)

The researcher used likert-scale type questionnaire (Vagias, 2006) and analyzed it through statistical data treatment such as mean and weighted mean.

V. RESULTS

Table 1 showed that in terms of cost, the statement, "Informal lending has a great impact on my business because it adds to my investment" has the highest weighted mean with 3.65 and interpreted as "Strongly Agree."

Table 1. Perception about Cost

STATEMENT	WM	VI
Informal lending has a great impact on my business because it adds to my investment.	3.65	Strongly Agree
I have enough business income avail informal lending.	3.31	Strongly Agree
I agree with the borrower's interest ratein informal lending because it's reasonable in terms of time length.	3.26	Strongly Agree
I am encouraged to borrow money in informal lending because of my emergency business needs.	3.46	Strongly Agree
I favor that when I did not pay the debtone of my assets would be taken.	3.31	Strongly Agree
Average Weighted Mean	**3.40**	**Strongly Agree**

Table 2 showed that in terms of discretion,the statement, "I borrowed money from informallending becauseit greatly helps my business," which has the highest weighted mean with 3.33 and interpreted as "Agree."

Table 2. Perception about Discretion

ITEMS	WM	VI
It's not hard to pay everyday on my borrowed money.	2.99	Agree
I will repay informal lending because it benefits me greatly.	3.19	Agree
I borrowed money from informal lending becauseit greatly helps my business.	3.33	Strongly Agree
Informal lending helps with my livelihood.	3.03	Agree
I balance my income and expensesto allocate payment for my debt.	3.25	Strongly Agree
Average Weighted Mean	**3.16**	**Agree**

Table 3 showed that in terms of Patience, the statement, "I pay on the agreed date of payment" which has the highest weighted mean with 3.43 and interpreted as "Strongly Agree."

Table 3. Perception about Patience

ITEMS	WM	VI
I pay on the agreed date of payment.	3.43	Strongly Agree
I always wait for the collector to arrive on the date of payment.	3.28	Strongly Agree
I pay based on our agreement terms.	3.26	Strongly Agree
I pay in advance of our agreed date of payment.	3.36	Strongly Agree
Average Weighted Mean	3.33	Strongly Agree

Table 4 showed that in terms of Sympathy or Humanity, the statement, "I apologize whenever I cannot pay for our agreed date of payment." which has the highest weighted mean with 3.36 and interpreted as "Strongly Agree."

Table 4. Perception about Sympathy or Humanity

ITEMS	WM	VI
I tell the cause of the delay of payment to the collector.	3.33	Strongly Agree
The collector and I treat each other well.	3.17	Agree
Every time I miss paying, I ask for consideration with the collector.	3.35	Strongly Agree

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I apologize whenever I cannot pay for our agreed date of payment.	3.36	Strongly Agree
Average Weighted Mean	**3.30**	**Strongly Agree**

Table 5 showed that in terms of Reliability, the statement, "It is easy to borrow money from informal lending without formal requirements" which has the highest weighted mean with 3.41and interpreted as "Agreed."

Table 5. Perception about Reliability

ITEMS	WM	VI
In times of emergency, Informal lending is very reliable.	3.34	Strongly Agree
Informal lending helps the people without enough credentials to loan money.	3.38	Strongly Agree
It is easy to borrow money from informal lending without formal requirements.	3.41	Strongly Agree
In terms of business matters, informal lending is realiable.	3.19	Agree
Average Weighted Mean	3.33	Agree

VI. CONCLUSION AND DISCUSSION

Generally, the respondents were satisfied with the aim of informal lending institution but they still need to gain more knowledge about this institution. The findings of the study are as follows: in terms of cost, informal lending adds investment to business; in terms of discretion, informal lending greatly helps the business; in terms of patience, payment usually is given on the agreed date; in terms of sympathy or humanity, apology seems to be effective in not meeting the agreed date; and in terms of reliability, the ease of access to informal lending.

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The Effects of Prohibiting Smoking in Public Places in Cabanatuan City

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***Abstract*— *The research conducted to know the effects of prohibiting smoking in public places in Cabanatuan City on the users of cigarettes in Cabanatuan Terminal, Cabanatuan Market and in Nueva Ecija University of Science and Technology (NEUST) Campuses. The question serves as an instrument to gather the needed information to sustain the problem stated. The profile of the respondents also asked to complete the data needed. Statistical treatment was used to get the percentage of the question. Based from the data gathered, the researchers drawn conclusions regarding to the effects of prohibiting smoking in public places in Cabanatuan City on the users of cigarettes of Cabanatuan Terminal, Cabanatuan Market and NEUST Campuses. The main cause of smoking is weak legislation cause users of cigarette. On the result of the effects of smoking is air pollution and it is one of the major causes of global warming. Therefore, the researchers formulated the following recommendation based on the smoker's responses: there should be a strict implementation of the rules and regulations to avoid smoking and at the same time to lessen a person smoking in public places; there should be an increase of tax of cigarette to lessen the buyers; and the government should add more police officer to secure the public places if there's anyone who violates the law about smoking ban.*

Keywords*— *Smoking, Weak Legislation, Rules and Regulations, Cigarette, Smoking Ban.

I. INTRODUCTION

The growing number of countries, states / provinces / territories and cities around the world that have or are preparing to enact extensive smoke-free policies represents a global shift toward smoke-free public places and workplaces. (Griffith et al., 2008)

According to Tobacco Regulation Act of 2003, smoking refers to the act of carrying inhaled or smoked a lighted cigarette or other tobacco products. On the contrary, Deluna and Maneja (2015) concluded that depending on the respondents ' interpretation, the anti-smoking media campaign did not affect the respondents ' smoking conduct. Thus, Mojares et al. (2012) recommended that authorities should be able to devise effective ways of identifying the precise boundaries protected by the Order.

According to the result of 2009 Global Adult Tobacco Survey (GATS), almost half of adult males and females are current smokers. Moreover, twenty three percent (23%) of Filipino adults are daily tobacco smokers; Thirty eight percent (38%) for males and seven percent (7%) for females. Male daily smokers consume 11 cigarettes per day while female daily smokers consume seven (7) cigarettes per day.

Alechnowicz and Chapman (2004) stated that the Philippines was the fifteenth largest consumer of tobacco products and actually has one of Asia's highest smoking rates and some of the lowest smoking rates prices. Stated by Geronimo (2017), the Department of Health (DOH) said "scare tactics seem to have work well among the Filipino working population". The Philippine said "made progress in protecting the public from exposure to second hand smoke."

Das (2003) concluded that there are several carcinogens in cigarette smoke that change biochemical defense systems and contribute to lung cancer. Fichtenberg and Glance (2002) added that in shielding non-smokers from passive smoking, smoke-free workplaces often allow smokers to quit or reduce their intake.

In the City of Cabanatuan, most of men are smoking in public places that can cause accident and it is not good for the health of the person smoking and most of all to a person who are second-hand smoker.

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II. OBJECTIVES OF THE STUDY

The study attempted to describe the possible causes of smoking in Cabanatuan City and the possible effects of prohibiting cigarette smoking in Cabanatuan City.

III. METHODOLOGY

The descriptive method of research was used in this study because it involves description, recording, analysis and interpretation of condition that really exists. It is appropriate to use descriptive method in gathering information about the present existing condition (Creswell, 2014). Also, Weighted Mean, Relative Important Index and Ranking were used as statistical treatment as basis of analysis for the gathered information

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IV. RESULTS

Table 1 shows the rating of the items under weak legislation implementation as perceived by all of the respondents. The table above shows that Q5 (Does weak legislation cause users of cigarette?) got the highest mean among the items with 3.81 total weighted mean and verbally interpreted as OFTEN /AGREE. On the other hand, Q3(Do police officers' negligence cause smoking in public?)got the lowest mean with 2.04 total weighted mean and verbally interpreted as RARE/DISAGREE.

Table 1. Causes of Smoking

ITEM STATEMENT	WEIGHTED MEAN
Q1. Do street vendors mistake cause many people smoke in public places?	3.56
Q2. Do smokers in public places cause second-hand smoker?	3.80
Q3. Do police officers' negligence cause smoking in publics?	2.04
Q4. Does weak implementation cause violation in smoking ban?	3.04
Q5. Does weak legislation cause users of cigarette?	3.81
TOTAL WEIGHTED MEAN	**3.87**

Table 2. Effects of Smoking

ITEM STATEMENT	RII	RANKING
Do you think smoking should be banned?	0.06	4
Do you think that passive smoking kills millions of people per year?	0.07	3
Do you think smoking can cause air pollution?	0.1	1
Do you think smoking is the main reason for vehicle accidents?	0.08	2
Do you think smoking is one of the major causes of global warming?	0.08	2
Do you think smoking can relieve your stress?	0.08	2
Do you think smoking is good to your health?	0.04	5
Do you think the youth follow the rules of smoking ban in public places?	0.06	4
Does smoking cause restlessness?	0.08	2
Do you think smoking is expensive vise?	0.07	3

Table shows the rating of the items under the effects of prohibitingas perceived by the worker-respondents. The table above shows that Q3 (Do you think smoking can cause air pollution?) got the highest RII (Relative Important Index) among the items with 0.1. On the other hand, Q1 (Do you think smoking should be banned?) and Q8 (Do you think the youth follow the rules of smoking ban in public places?) got the lowest RII (Relative Important Index) with 0.06.

V. CONCLUSION AND DISCUSSION

Based on the above findings of the study, the findings were the main cause of smoking is "Weak Legislation Implementation." There should be a strict implementation of the rules and regulations to avoid smoking and at the same time to lessen a person smoking in public places and an increase of tax of cigarette to lessen the buyers. On the result of the effects of smokingis air pollution and it is one of the major causes of global warming.

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