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Response Surface Methodology and Its Application in Evaluating Scientific Activities in a Federal University of Technology

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This paper used a second-order response surface methodology (RSM) to modeled the relationship between some selected university ranking indicators and citation variables. The objectives were to investigate which of the selected indicator(s) are relevant to the number of citations received on publication and obtain the best link function that relate the factors variables to response variable, also check if there exist an interaction effect between the selected ranking indicators. The University ranking indicators used in this paper were sourced from google scholar, research gate, the University repository and through questionnaire. The observations were treated as quasi-experimental designs. The causal effect of Publication was funding, collaboration, human resources, department facility, which were highly significant. Also, the causal effect for Citation were numbers of articles, collaboration, undergraduate and postgraduate project were highly significant and follow second order model with interaction. The obtained model was used to fit possible

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number of publication and citation ($\mathbf{y_i}$) for differently assumed factors and graphical method was used to compare each paired factors to the number of citations on 3D plots. Using contours plot and surface plot highest citation is reached only in department with high production, human resources, funds, facilities and more collaboration. Based on these results, it is recommended that, research collaboration among the university researchers should be highly encourage, and there should be a provision for more facility in the department in other to maximize research output of the departments.

Keywords: Ranking; response surface methodology; citation; full factorial experiment; publication.

1. INTRODUCTION

The drives for globalization in all facets of research, universities development and ranking as an essential aspect of checkmating the standard of an institution among its peers at national and international level cannot be over emphasized. Most ranking methods make use of institutions' scientific activities, which can be model for the purposed of ranking. When modeling universities scientific activities, it is required that the system under study should have stated borders and identify the set of factors called input that affects the system (say, numbers of researchers, funding, and facilities, as they affect a university ranking). This model in turn generates or responds to products resulting from their scientific activity called output, such as publications and citation. This relationship which links inputs together with outputs is complex and difficult to describe with just simple mathematical models. Hence, there is need for tools that are capable of more complex modeling and that can achieve maximum modification of roles of each variable in the system. This will also check if there is synergetic or opposing interrelationships between the same variables. To create citizens who successfully operate digital technologies, it is necessary to change the model and way of university governance. The smart university development orientation is a development roadmap in line with the 4.0 higher education trend. This orientation is deployed and strongly applied information technology to the work of education-training, scientific research in line with the trend of higher education. Nguyen et al., [1] uses the approach, research from a management perspective, and the method of analysis and synthesis to make judgments and assessments about the digital university governance model. The results of the article have provided the foundational theories of university governance in the context of digital transformation. Thereby, the article proposes and makes some recommendations on innovation in governance at universities in Vietnam.

The response surface methodology (RSM) is a collection of mathematical and statistical techniques useful for the modeling and analysis of problems in which a response of interest is influenced by several variables and the objective is to optimize this response [2]. It is based on the experimental design with the final goal of evaluating optimal functioning of industrial facilities, using minimum experimental effort, here the inputs are called factors and the outputs represent the response that generates the system under the causal action of the factors [3].

Several different methodologies for the response surface process were first introduced in the 1950s by Box and others (Box and Wilson [4] & Myers et al., [5]). RSM is commonly used in chemometrics, food science, and biochemistry since that time. Response surface models are techniques that are based on fitting an experimental model to the experimental data obtained in regard to an experimental design Myers et al., [5]. Most applications of RSM for optimization involve of the following several stages: First, a screening factor is run to reduce the number of factors (independent) variables to a relative few, so the procedure will be more efficient and require smaller number of runs or tests. Secondly, determination is made on current levels of the major effect factors resulting in a value for the response that is close to the optimum region. If the current levels of the factors are not consistent with optimum performance, then the experimenter must adjust the process variables that will lead the process toward the optimum level. Thirdly, researchers carry out the chosen experimental design according to the selected experimental matrix. Next, mathematical/statistical models of the experimental design data are developed by fitting linear or quadratic polynomial functions. The fitness of the models then needs to be evaluated. Lastly, the stationary points (optimum values) are obtained for the variables Myers et al., [5].

Diffusion of knowledge is a real significant factor for students also it is the most important role of universities. To diffuse knowledge, sharing is an important activity. Hoa et al. [6] examines factors influencing knowledge sharing in higher education. knowledge sharing is measured through knowledge transferring and knowledge reception. A quantitative survey was conducted with 517 undergraduate students in Vietnam. statistical package for the social sciences version 28.0 (spss 28.0) software was used to analyze data. the internal consistency reliability was tested by Cronbach's alpha coefficient and the factor reduction was analyzed by exploratory factor analysis (EFA) model. The results of the study revealed that there is evidence of a positive relationship between factors including trust, knowledge self-efficacy, university support, lecturer support, physical environment, technology infrastructure, and ICT tool use and knowledge sharing. These findings are significant, as understanding these factors would help to stimulate knowledge sharing among students in higher education.

Dhawan and Gupta [7] studies citations performance of 1101 Indian physics research papers published in 29 high impact physics journals in 1997. The study was based on citations won by these papers within six years of publication. The aim is to verify to what extent research evaluation based on journal impact factor can be considered objective and fair. The study finds that journal impact factor is not a surrogate to citations. Nearly 12% of papers in high impact journals did win even a single citation within six years of their publication. Secondary papers winning high range of citations per paper were published in a wide range of impact factor journals. In conclusion it is said that although impact factor is not a guarantee to citations but publication in high impact journals does improve the probability of winning citations.

Tinh, et al., [8] used qualitative analysis with statistics to propose recommendations for teaching methodology to students at all levels from undergraduate schools to doctoral and even associate professors. It was concluded that for undergraduate students, there is need to equip foundation knowledge to enter business work and work environment, knowledge including politics, economic or technology, language (English, Chinese, Japanese, and others) and sports. For post graduate level, there is need to train students both English and computer skills to produce qualified reports for management and write economic, marketing and management reports. And for doctoral level, there is need to train the how to use English to communicate, write and produce very good articles to publish in famous journals such as ISI, Scopus, ABDC high rank.

In a related study conducted by Iroaganachi and Itsekor, [9] on a citation analysis of social science. It was found that the author cited more from text books than journal and internet/electronic resources. Citation from books was about 69.4% followed by journals with 16% and internet/ e-resources with 8% among others.

Some researchers have reviewed the response surface methodology and have come to some basic conclusions. In the work of Myers et al., [10], the orthogonal design was motivated by Box and Wilson [4] in the case of the first-order model. And in the case of second-order models, many subject matter scientists and engineers have a working knowledge about the central composite designs (CCDs) and three-level designs by Box and Behnken [11]. Also, the same research states that another important contribution came from Hoerl [12], who made an effort to create a more economical or small composite design.

Nonetheless, RSM has an effective track-record of helping researchers for improved products and services: For instance, Box's model on response-surface approach enabled chemical engineers to improve a process that had been stuck at a saddle-point for years. This model also reduced the costs of experimentation for the engineers to afford to fit a cubic three-level design to estimate a quadratic model, and their biased linear-models estimated the gradient to be zero. Box. and Wilson [4].

This study used response surface methodology to model relationship between some selected university ranking indicators and citation variables. The study investigates which of the selected indicator(s) are relevant to the number of citations received on publication and also obtain the best link function that relate the factors variables to our response variable, also check if there exist a synergy (interaction effect) between the selected ranking indicators.

2. MATERIALS AND METHODS

2.1 Materials

The data used in this study was extracted from the scientific production of thirty-eight (38) departments of the Federal University of Technology (FUT) Minna, using the university yearly report book. The production data and citations were taken from the research gate and google scholar. The information on economic and human resources were sourced from the university repository. The indicators used in the evaluation of the FUT, Minna are: number of publications; number of citations; number of researchers (human resources); economics resources (funds); facilities (equipment); numbers of patent' number of post graduate projects; number of undergraduate projects and numbers of partnership (Collaboration). The study used the following indicators in the analysis: Department = DPT, Articles = ATC, Citation = CTN, Human resources = HR, Funds = FD; Undergraduate = UG, Postgraduate = PG, Collaboration = COL, and Percentage of facility = FAC.

2.2 Methods

2.2.1 Response Surface Methodology

The Response Surface Methodology equation can be expressed as:

$$\boldsymbol{y = f(x_i, x_2) + \epsilon} \quad (1)$$

where $\boldsymbol{y}$ is the response (output) variable, $\boldsymbol{x_i}$ and $\boldsymbol{x_2}$ are independent (input) variables and $\boldsymbol{\epsilon}$ is the experimental error term represents any measurement error on the response, as well as other type of variations not counted in $\boldsymbol{f}$**.**

But if the response can be defined by a linear function of independent variables, then the approximating function is a first-order model. A first-order model with 2 independent variables can be expressed as

$$\boldsymbol{y = b_0 + b_1x_1 + b_2x_2 + \epsilon} \quad (2)$$

If there is a curvature in the response surface, then a higher degree polynomial should be used. A second-order model with two independent variables can be expressed as:

$$\boldsymbol{y = b_0 + b_1x_1 + b_2x_2 + b_{11}x_{11}^2 + b_{22}x_{22}^2 + b_{12}x_1x_2 + \epsilon} \quad (3)$$

2.2.2 Assumptions of Response Surface Methodology (RSM)

The assumptions are:

(i) Error term is assumed to distribute normally with zero mean and variance $\boldsymbol{\sigma^2}$.
(ii) The true response function $\boldsymbol{f}$ is unknown.
(iii) The experiment starts with a low order polynomial in some small region

2.2.3 The analysis of variance (ANOVA)

Hypothesis

The proposed equation to define the responses variable (Numbers of Article) are the effects of the selected input variables (Human resources, Collaboration, Fund and Facility). To define the response equation, H.R, COL, FD, and FAC are assigned to ATC and we have:

Also,

The proposed equation to define the responses variable (Numbers of Citation) are the effects of the selected input variables (Numbers of Article, Collaboration, Undergraduate project and Postgraduate project). To define the response equation, ATC, COL, U.G, and P.G are assigned to CTN and we have:

The null hypothesis states that there is no quantifiable/significant effect of Input variables in the overall responses (output) variable. If this hypothesis is true then:

$$: b_1 = b_{11} = 0 \ , \ b_2 = b_{22} = 0 \ , \ b_3 = b_{33} = 0 \ , \ b_{12} = b_{13} = b_{23} = 0 \quad (4)$$

$$\beta_1 = \beta_{11} = 0 \ , \ \beta_2 = \beta_{22} = 0 \ , \ b_3 = \beta_{33} = 0 \ , \ \beta_{12} = \beta_{13} = \beta_{23} = 0 \quad (5)$$

The alternative hypothesis postulated that at least one of the coefficients is different to zero. Then:

: At least one $b \neq 0$ (6)

: At least one $\beta \neq 0$ (7)

2.2.4 Experimental design versus quasi-experimental design

The experimental designs represent the empirical support of the response surfaces. In the case of a controllable system in a laboratory, the planning and execution of an experimental design implies no more problem than that inherent in the experimentation itself. On the other hand, certain novelties have to be introduced into the methodology if RSM will be used for the evaluation of scientific activity.

Although the scientific activity cannot be manipulated in the sense in which variables of physicochemical phenomena are manipulated in a laboratory, they can be selected. That is, quasi-experimental designs, which are governed by the same rules as experimental designs. Admitting this, it is clear that the RSM is feasible. Research thus confirmed the validity of the quasi-experimental design proposed.

The following terms represent the indicator in the analysis; Department = Dept, Articles = Atcl, CTN = Citation, H.R = Human resources, U.G = Undergraduate, P.G = Postgraduate, COL = Collaboration, FAC = Percentage of Facility.

3. RESULTS

Fitting of second order linear model with interaction provides the results of analyses of factors affecting numbers of Publication and factors affecting numbers of citation received in F.U.T Minna (2012-2016) respectively. The experimental design is shown in Table 1.

The second-order linear model of factors affecting numbers of publication in F.U.T Minna from 2012 to 2016, it was obtained from the result in Table 1 that, the first order effects (HR, COL, FD, and FAC) and their quadratic effect are negligible. That is, not significant while there is a response with respect to the interaction of (HR: COL), (HR: FD), (HR: FAC), (COL: FD), (COL: FAC) and (FD: FAC) which signifies that there is a synergistic effect between the two factors interaction in contributing to numbers of publication.

Also, the overall F-test for all the regression is significant, F-statistic = 3.935 greater than F-table (14, 23, 0.05) = 2.13, and *p-value* = 0.001818 less than significant level (0.05). Multiple R-squared (R^2 = 0:7055), implies that 70:55% of variation in numbers of publication is well explained by the fitted model (ATC) and that the regression equations fit the sample data. Adjusted R-squared (Q^2 = 0:5262), implies 53% of goodness of fit of the model.

The second order model for the fitted numbers of Publication (Articles) by following the same procedure in (Myers and Montgomery, 2009) is presented as

$$\begin{aligned} \mathrm{ATC} = -157.05 &- 7.18(\mathrm{H.R}) + 74.28(\mathrm{COL}) \\ &- 0.1122(\mathrm{FD}) + 2.833(FAC) \\ &+ 0.2503(\mathrm{H{:}R})^2 - 4.979(\mathrm{COL})^2 \\ &- 0.000005(\mathrm{FD})^2 - 0.0577(\mathrm{FAC})^2 \\ &+ 1.232(\mathrm{H.R{:}\,COL}) \\ &+ 0.0040(\mathrm{H.R} : \mathrm{FD}) \\ &+ 0.1387(\mathrm{H.R} : \mathrm{FAC}) \\ &+ 0.0126(\mathrm{COL} : \mathrm{FD}) \\ &+ 0.082(\mathrm{COL} : \mathrm{FAC}) \\ &- 0.0005(\mathrm{FD} : \mathrm{FAC}) \qquad (8) \end{aligned}$$

and the contour plot and response surface plot of this model are shown in Fig. 1 and 2 respectively.

Fig. 1 illustrates a surface with a maximum among the indicator interaction. While Fig. 2 illustrates a surface with a maximum (high number of publication) when the indicators interact together.

The ANOVA table for lack-of-fit test is shown in Table 2. The mean square is an estimate of population variance; it is obtained by dividing the sum of squares by the corresponding number of degrees of freedom. The F-value compares the mean square with the residual mean square. The corresponding *p-value* (Prob > F) is the probability of obtaining an *F-value* equal to or more extreme than what we observed in our sample assuming the null hypothesis is true (there is no significant difference of factor effects).

Table 1. Analysis of Full Factorial Experiments on Publication

Term	Estimate	Std. Error	t-value	Pr(>|t|)	Reject H_0	Sig
(Intercept)	-157.05	0.0047701	-0.3292	0.74495	No	No
HR	-7.1800	0.0173970	-0.4129	0.68348	No	No
COL	74.280	0.9506900	0.7813	0.44258	No	No
FD	0.1122	0.0087825	-1.2778	0.21405	No	No
FAC	2.8330	0.0693020	0.4088	0.68645	No	No
HR: COL	1.2320	0.0153160	-0.8043	0.01949*	Yes	Yes
HR: FD	0.0040	0.0017940	2.2475	0.03450*	Yes	Yes
COL: FD	0.0126	0.0064469	1.9569	0.0244*	Yes	Yes
COL: FAC	0.0820	0.7327400	0.1119	0.91187	No	No
FD: FAC	-0.0005	0.0005163	-0.8776	0.38926	No	No
$(H: R)^2$	0.2503	0.0239980	1.0430	0.30778	No	No
$(COL)^2$	-4.979	0.0719280	-0.6923	0.49570	No	No
$(FD)^2$	0.00001	0.0000569	-0.8386	0.41032	No	No
$(FAC)^2$	-0.0577	0.0042880	1.3457	0.19150	No	No

Multiple R-squared = 0.7055; Adjusted R-squared = 0.5262; F-statistic = 3.935 on (14, 23) DF, P-value = 0.001818

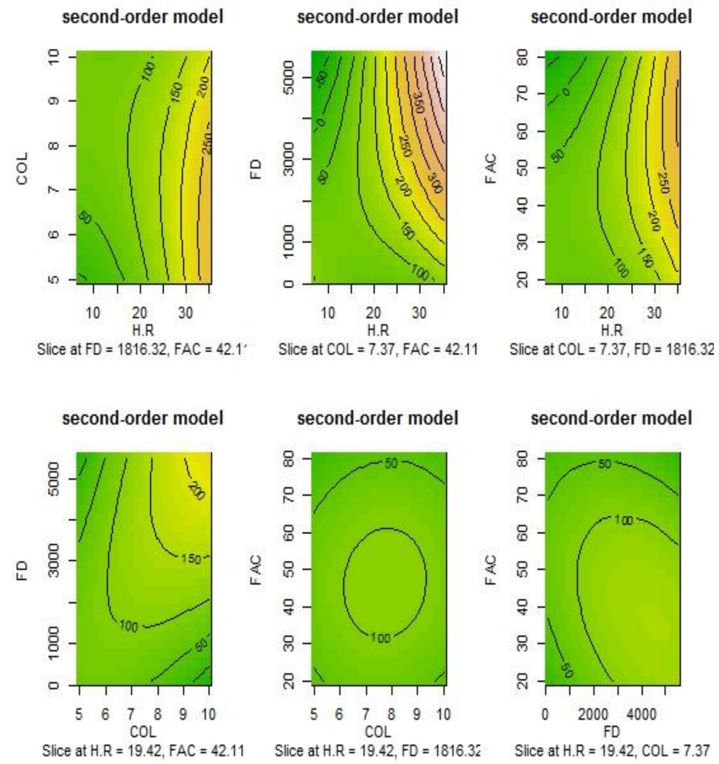

Fig. 1. Contour plot illustrating a surface with a maximum among the indicator interaction

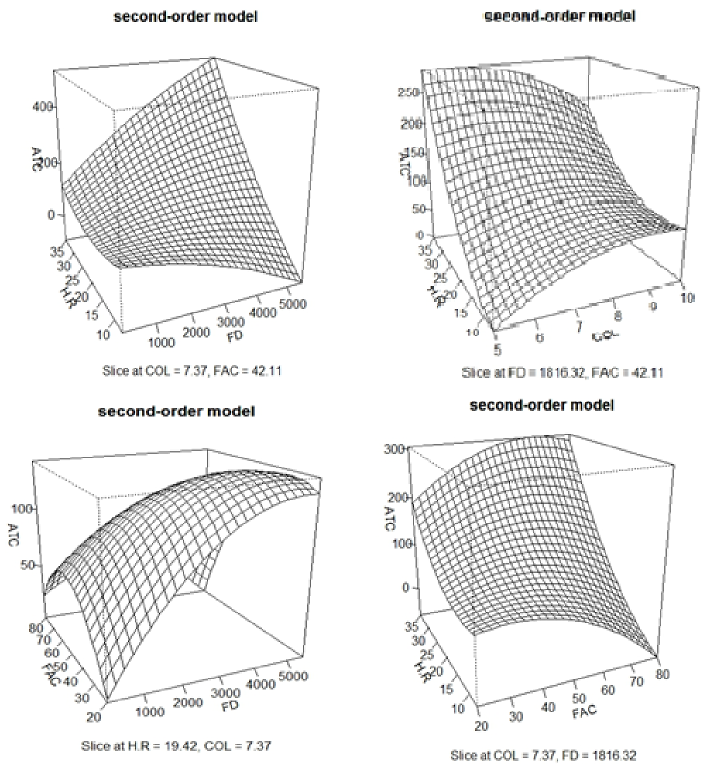

Fig. 2. Response surface plot

Table 2. Analysis of Variance for the second first order model on Publication for lack-of-fit test

Source of Variation	Df	Sum of Square	Mean of Square	F-cal	Pr(>F)	Reject
FO (HR, COL, FD, FAC)	4	143917	35979	8.0402	0.0003295	Yes
TWI (HR, COL, FD, FAC)	6	87689	14615	3.2660	0.0179736	Yes
PQ (HR, COL, FD, FAC)	4	14924	3731	0.8338	0.5176208	No
Residuals	23	102923	4475			

Table 3. Analysis of Full Factorial Experiments on number of citations received in F.U.T Minna (2012-2016)

Term	Estimate	Std. Error	t-value	Pr(>|t|)	Reject H_0	Sig
(Intercept)	578.521	133.580	4.3309	0.0002468 *	Yes	Yes
HR	-7.1838	17.397	-0.4129	0.68348	No	No
ATC	1263.254	284.764	4.4361	0.0001898 *	Yes	Yes
COL	94.789	112.281	-0.8442	0.0407243 *	Yes	Yes
UG	453.676	212.701	2.1329	0.0438248 *	Yes	Yes
PG	251.005	205.965	1.2187	0.02353200*	Yes	Yes
ATC: COL	757.803	401.178	1.8889	0.00715739*	Yes	Yes
ATC:UG	3766.788	943.827	3.9910	0.0005753*	Yes	Yes
ATC:PG	-1008.354	433.474	-2.3262	0.0291777*	Yes	Yes
COL:UG	-908.384	395.660	-2.2959	0.311326	No	No
COL:PG	284.281	331.767	0.8569	0.4003562	No	No
UG:PG	971.075	576.369	1.6848	0.1055473	No	No
$(ATC)^2$	-1991.989	677.730	-2.9392	0.0073675*	Yes	Yes
$(UG)^2$	-559.370	303.660	-1.8421	0.0783921	No	No
$(PG)^2$	-390.213	295.562	-1.3202	0.1997432	No	No

Multiple R-squared: 0.7854; Adjusted R-squared: 0.6548; F-statistic: 6.013 on 14 and 23 DF, p-value: 0.00008414

Table 4. Analysis of Variance for the second first order model on citation for lack-of-fit test

Source of Variation	Df	Sum of Square	Mean of Square	F-cal	Pr(>F)	Reject
FO (ATC, COL, UG, PG)	4	5963183	1490796	14.0367	0.0000061	Yes
TWI (ATC, COL, UG, PG)	6	1617383	269564	2.5381	0.04926	Yes
PQ (ATC, COL, UG, PG)	4	1360519	340130	3.2025	0.03145	Yes
Residuals	23	2442758	106207			

The first order model has the *p-value* (0.0003295 < 0.05), which implies that the predictor variables have an additive effect on the response variable. This also means that there is no significant lack of fit with the first model. The two-way interaction model has *p-value* (0.0179736 < 0.05), shows that the interaction of (HR, COL, FD, FAC), is not negligible. That is, there is no significant lack of fit in the interaction model. The pure quadratic effects have *p-value* (0.5176208)> 0.05), shows that, there is no indication of a pure quadratic effect in the model.

The second-order linear model of factors affecting numbers of citation directed to the F.U.T Minna between (2012-2016), it was opined from the result in Table 3 that, the first order effects (ATC, COL, UG, PG), interaction between ATC: COL and quadratic effect of $(ATC)^2$ were the only significant predictor variable while the rest variables are negligible in contributing to citations. Also, the overall F-test for all the regression is significant. That is, F-statistic: 6.013 greater than F-table (14, 23, 0.05) = 2.13, and *p-value*: 0.000084 less than significant level (0.05). Multiple R-squared (R^2) = 0:7854, implies that 78:54% of variation in numbers of citation is well explained by the fitted model (CTN) and that the regression equations fits the sample data. Adjusted R-squared (adjR^2 = 0:6548), implies 65:48% of goodness of fits of the model.

The first order model has the *p-value* (0.0000061) < 0.05), which implies that the predictor variables have an additive effect on the response variable. That is, there is no significant lack of fit with the first model. The two-way interaction model has *p-value* (0.04926) < 0.05), shows that the interaction of (ATC, COL, UG, PG), is not negligible. That is, there is no significant lack of fit in the interaction model. The pure quadratic effect has *p-value* (0.03145) < 0.05), shows that, there is indication of a pure quadratic effect in the model.

The diagnostics and plots of estimated response surfaces in Fig. 3 displays the random pattern residuals plot of numbers of articles, numbers of undergraduate project and postgraduate, which it is an indication for a good fit of linear model while collaboration residual plot shows a nonrandom pattern, which it is an indication for a nonlinear model.

In many surface analyses, it is preferable to work with scaled residuals, as these often provide more information than ordinary least squares residuals. The random pattern of residuals against order of data plot and residual against. fitted plot is presented in Fig. 3. It also displays cooks' distance of observation which need to be investigated by having higher number of outliers in the fitted model.

Data were analyzed to check the normality of residuals. Fig. 5 displays the normal probability (quantiles-quantiles) of residuals for response plot. This plot shows that residuals are normally distributed. From this figure, it was observed that for residuals, all the plotted points feel close to the distribution fitted line. In all, it was observed that the normal distribution plots would be a better choice for analyzing interested responses (properties) compared to residuals vs. order of data plots disparity between prediction values and actual experimental values.

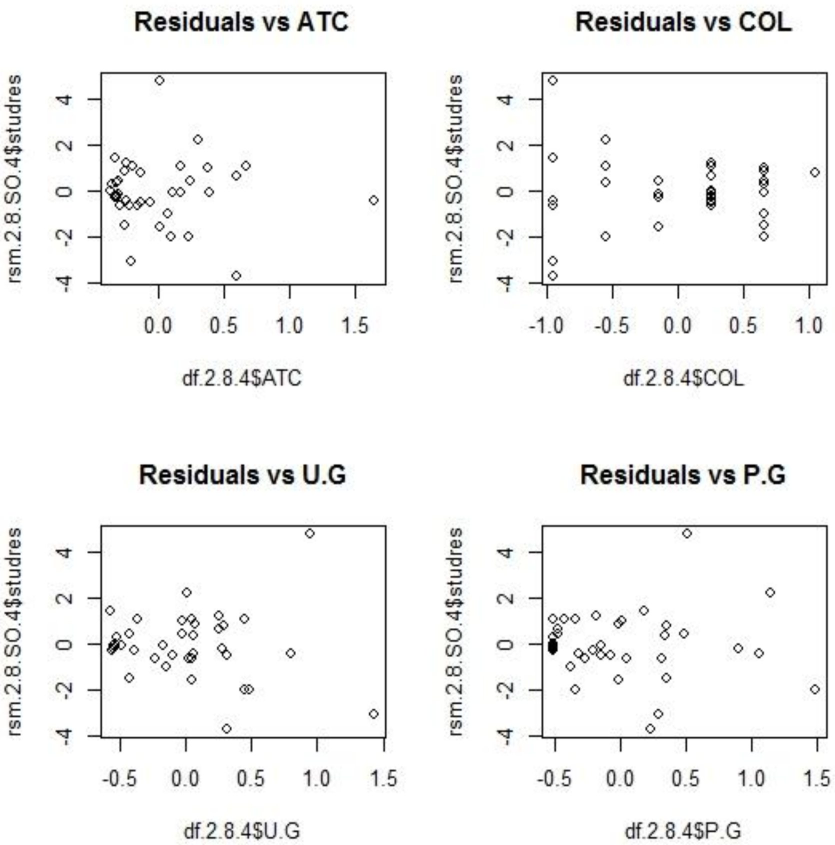

Fig. 3. Residuals Plot of ATC, COL, UG, and PG

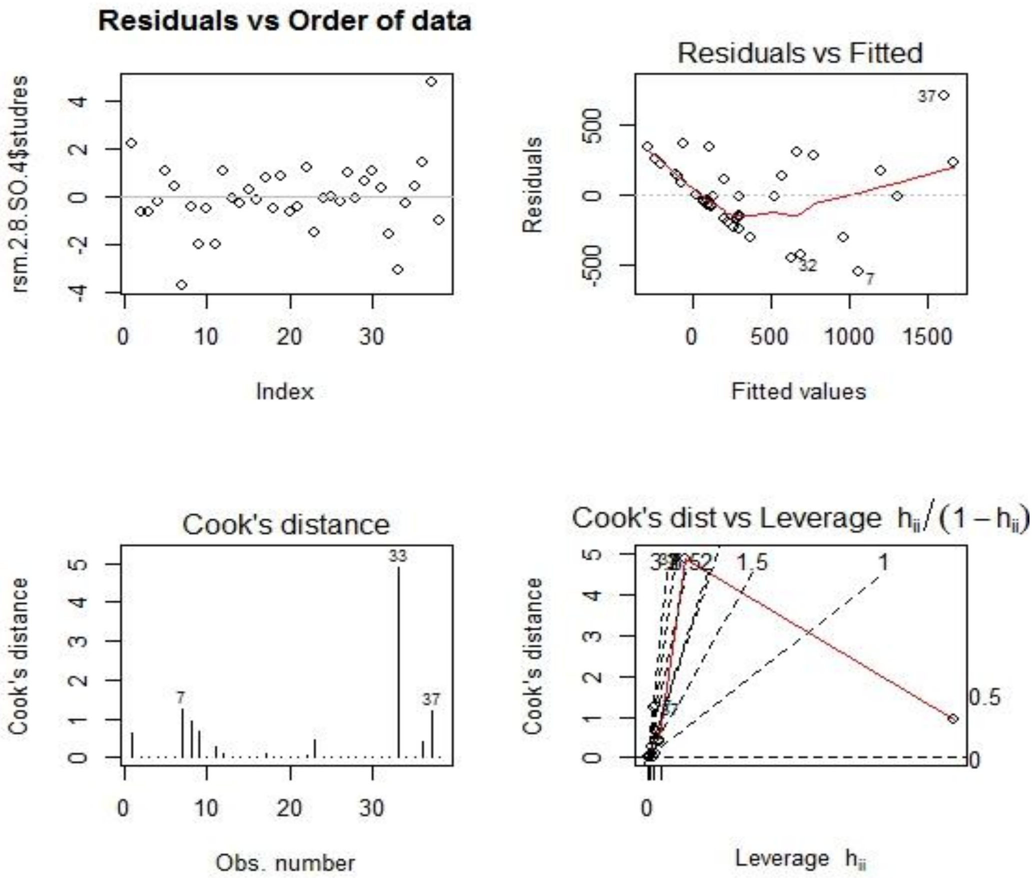

Fig. 4. Residuals vs. order of data

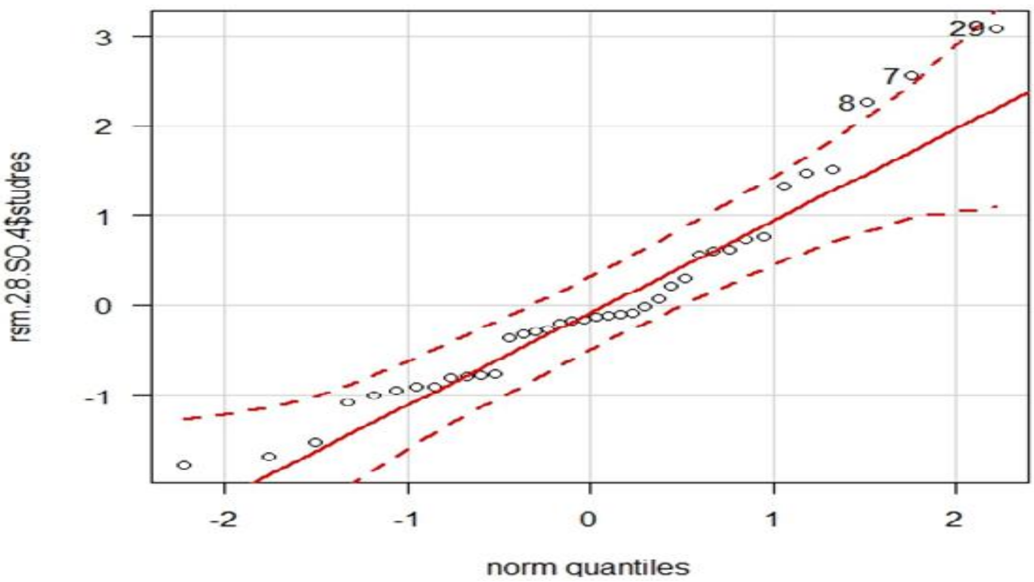

Fig. 5. Normality of Residuals

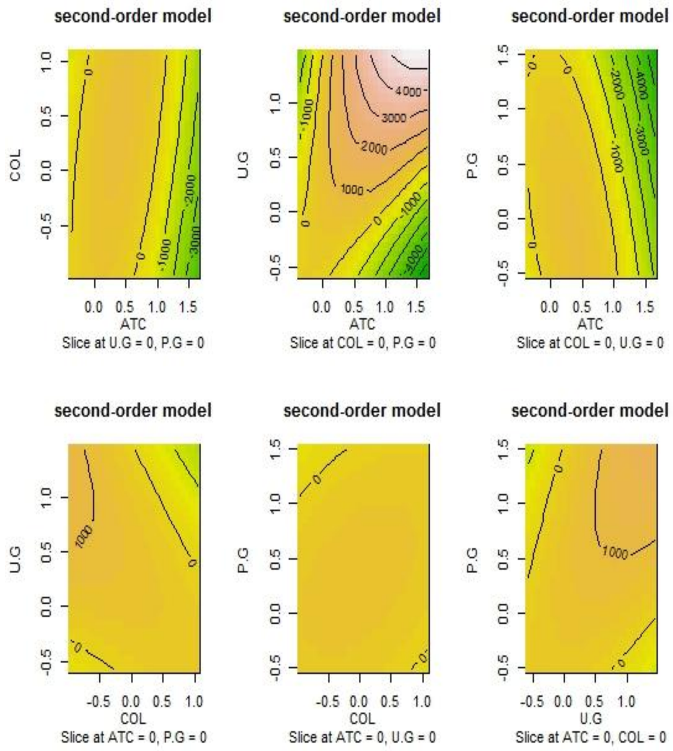

Fig. 6. Contour plot

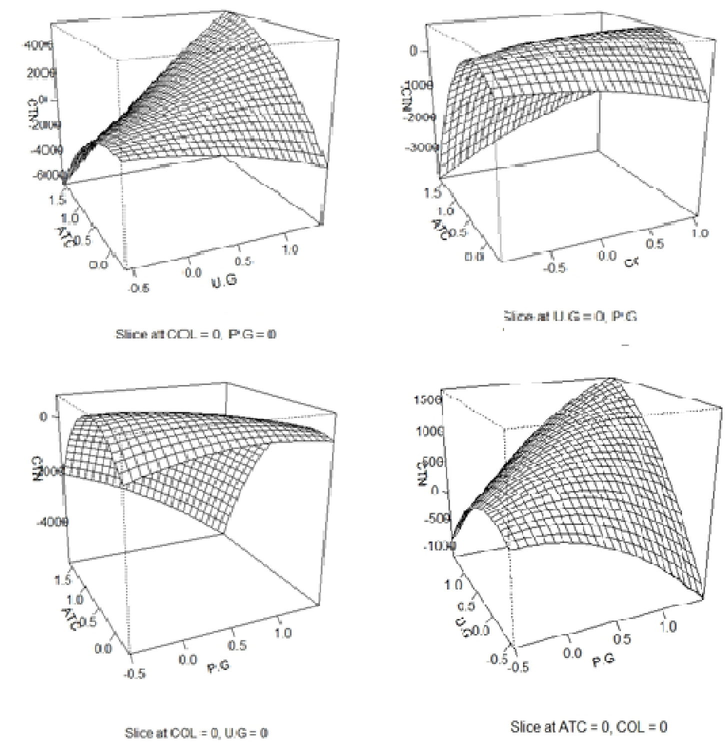

Fig. 7. Response surface

Fig. 6 illustrates a surface with a maximum among the indicator's interaction. While Fig. 7 illustrates a surface with a maximum among the indicator's interaction

4. DISCUSSION

In this work, the possibility of the response surface methodology was explored with the scope of analyzing the effect of selected university ranking indicators which constitute to numbers of publication and citations, which bring about quality research output of the institution.

Table 1 showed the analysis of full factorial experiment on factor affecting numbers of Publication in FUT Minna. There were significant interaction/synergy effect between the coefficient of H.R*COL and H.R*FD, H.R*FAC and between COL*FD. From Table 2, ANOVA of second first-order model on publication shows that all the sources of variation that is, first-order, two-way interaction and pure quadratic effect were all significant and has effect in contributing to the number of publications. The causal effect of Publication were funding, collaboration, human resources and department facility. Based on this result, there should be more collaboration among the researchers in federal university of technologies. Also Fig. 1 represented contour plot and Fig. 2, illustrated response surface plot with a maximum (high number of publication) when the indicators interact together.

Table 3, presented analysis of full factorial experiment on factor affecting number of citations received on publication, there was a significant contribution of interaction of articles and collaboration. Undergraduate and post graduate project also contributed to the number of citations. The causal effect of citation were numbers of articles, collaboration, undergraduate and postgraduate project, The contour and response surface plots with a high number of publication when the indicators interact together were illustrated. Using contours plot and surface plot highest citation is reached only in department with high production, human resources, funds, facilities and more collaboration. Therefore, provision of adequate facilities in the departmental laboratory to help researchers in their research work so as to elevate research output to maximum is recommended.

The ANOVA of second first-order model on citation in Table 4 suggested that effect of each first-order model, two-way interaction and pure quadratic effect on citation were significant. The goodness of fit of the response surface model confirmed acceptable with value of coefficient of determination $R^2 = 0.7$ and adjusted R-square $Q^2 = 0.5$ and the F-test also, confirmed that the fit is satisfactory at the significance level of 5%.

5. CONCLUSION

The following conclusions were derived from the study:

i. From the result in Table.1, the first order effects (H.R, COL, FD, FAC) and their quadratic effect are not significant while there is a response with respect to the interaction of (H.R: COL), (H.R: FD), (H.R: FAC), (COL: FD), (COL: FAC) and (FD: FAC) which signifies that there is a synergistic effect between the two factors interaction in contributing to numbers of publication.
ii. The lack-of-fit test in Table 2 suggested that, there is no indication of a pure quadratic effect in the second-order linear model of factors affecting numbers of publication in F.U.T Minna.
iii. From the result in Table 3, the first order effects (ATC, COL, U.G, P.G), interaction between ATC: COL and quadratic effect of $(ATC)^2$ were the only significant predictor variable while the rest variables are negligible in contributing to citations.
iv. The lack-of-fit test of Table 4 suggested that the second-order linear model of factors affecting numbers of citation directed to the F.U.T Minna have indication of a pure quadratic effect in the model.
v. This paper can be extended in a couple of ways. In addition to Central Composite Design (CCD) used for fitting the second-order model, Box-Behnken design can also be used for designing response surfaces. The second theoretical problem is that, since the second-order model is very flexible. the method of least squares can be used to estimate the parameters to determine the optimum conditions.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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