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Retraction

Retracted: Digital Modeling System for Dynamic Nonlinear Systems of Power Equipment in Digital Grids and 5G

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] S. Li, W. Guo, Q. Yan et al., "Digital Modeling System for Dynamic Nonlinear Systems of Power Equipment in Digital Grids and 5G," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 2835677, 11 pages, 2022.

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Research Article

Digital Modeling System for Dynamic Nonlinear Systems of Power Equipment in Digital Grids and 5G

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The digital power grid system is used to maintain stability and to provide a continuous supply of electrical energy to consumers in the event of a power outage or other interruption of service. This is due to their ability to respond quickly in the event of an interruption. However, unpredictable failures and cascading accidents occur regularly, resulting in a blackout that can cause significant disruption to modern life. Furthermore, the rotor angle behavior can indicate the overall synchronism and stability of the complete digital power grid system. The digital dynamic nonlinear system operators can profit economically and technically from implementing protection measures that are appropriately designed and implemented. This study has utilized data transitions over digital power grids, connectivity used in digital power grids, power quality, network congestion, and stability issues as independent variables. However, the digital dynamic nonlinear system has been used as the dependent variable. The data was collected using questionnaires, and the data was collected from various digital power grids and solar system users. The collected data was analyzed by using SEM PLS 3. The reliability of the collected data was tested by Cronbach's alpha and the values above 0.7. The results indicated that there are significant values between the variables.

1. Introduction

Globally, the digital power grid is the most complicated system, and they play a critical role in modern society. Digital power grids have a direct impact on modernization and the political, social, and economic aspects of society. It is necessary to employ a variety of control and protection strategies to operate such systems steadily [1]. On the other hand, modern systems are equipped with various protective measures to prevent power outage, and unpredicted events. Therefore, digital power grids continue to malfunction circumstances and meet emergency [2]. It is possible that the electricity system would experience cascade failures, resulting in a blackout if the incident is not properly handled. Because of the ramifications, several countries worldwide have professional teams and researchers which were dedicated to preventing blackouts on their electrical grids [3]. When it comes to the ability of power systems to maintain stability and deliver a continuous supply of electrical energy to its consumers, the ability of power systems to respond swiftly to a disturbance when one occurs is a critical consideration. Because the electricity system is stretched across a vast geographic area, the likelihood of encountering various sorts of faults and breakdowns is significant [4]. However, cascading catastrophes and unanticipated failures almost always result in a blackout, which can have a negative impact on modern society. Systems for digital power grid researches are operated at or near steady-state stability as energy demand increases, which increases the likelihood of a critical situation developing [5]. So that modern power systems can effectively deal with disturbances in the power grid, they must be supplied with appropriate control and protection mechanisms, among other things.

It is critical for the proper running of the electrical grid that the power systems can retain stability and offer a continuous supply of electrical energy to consumers even when there is a power loss; otherwise, the electrical grid will fail [6]. Because the power system is dispersed across wide geographic areas, it is susceptible to a variety of defects and breakdowns. Unpredictable failures and cascade accidents, unfortunately, frequently result in a blackout that can disrupt modern living [7]. So that modern power systems can effectively deal with disturbances in the power grid, they must be supplied with appropriate control and protection mechanisms, among other things. The stability and synchronism of the entire power system are also represented by the rotor angle behavior [8]. There is an abnormal event that will occur in the power system, such as an overload caused by a sudden reconnection of the power grid, a generator failure, or a transmission line trip. These are all examples of anomalous events.

In this particular case, it is necessary to address the frequency and voltage instabilities as soon as feasible. If these anomalous situations are not addressed quickly, the system may undergo cascade events that cause the system to blackout. The final line of defense against cascading events is power system protection methods [9]. Underfrequency load shedding (UFLS) and undervoltage load shedding (UVLS) are two approaches that are used to keep the voltage and frequency of the digital power grid system steady in the event of a large interruption, respectively. During the period between the beginning of the frequency/voltage decline and the violation of the predefined threshold, there is a brief window of opportunity to carry out the necessary restorative measures. Various protection measures have been deployed around the world for various power systems. They are designed to keep the system from separating further in the case of a disruption [10]. This is accomplished by gradually removing portions of the load from the system until the demand-generation balance is reached.

Activating protective measures in order to restore a suitable balance is necessary if the gap between demand and generation continues to widen; otherwise, the entire system, or at the very least a piece of it, risks collapsing. To avoid unintentional collapses in such cases, it is desirable if at all possible to lose portions of the load while retaining the overall system's stability, rather than the other way around [11]. Protection measures that are correctly planned and implemented can provide power system operators with economic and technical benefits. Protective methods were widely devised and applied in reality to mitigate the damaging impacts of blackouts [12]. The operation of photovoltaic electrical energy systems necessitates the use of complex control structures. Several decades ago, contemporary computer modeling and simulation techniques were introduced for the assessment of frequency domain (steady-state) and time-domain power systems [13]. System solutions were obtained through the application of several modeling and simulation approaches, which were developed separately throughout time in the frequency domain and time domain. On the contrary, this is not true in most situations. It is usual for findings to be inconsistent and erroneous when various power system evaluations do not use the same models or simulation techniques [14]. When it comes to electrical systems, this is in contrast to circuit simulation, where standardization of models and techniques assures that both steady-state and transient analysis provide consistent results [15].

Several benefits of the IoT and 5G network technologies include smart sensor interfacing, remote sensing and monitoring, and high-speed data transmission. Because of this, smart grid applications for these two are widely used. The paper's main goal is to offer a thorough analysis of power detection and categorization [16].

Quality disruptions were mitigated by talking about signal processing methods and AI tools with their and drawbacks, respectively [17].

2. Literature Review

Digital power grids are used in grid-connected solar systems to transform DC voltage PV output into alternating current waveforms that may be used by the electrical power grid [18]. The alternating current waveform must meet the amplitude and frequency requirements at the point of common connection [19]. It is necessary to link the inverter outputs to the grid voltages utilizing phase-locked loop techniques or synchronization algorithms in order to achieve this linkage between them [20]. Furthermore, controlling the harmonic content produced by switching the inverter's semiconductors and injecting it at the PCC is crucial for the inverter's performance [21]. Quality, continuity, and reliability concepts necessitate the inclusion of additional features such as anti-islanding protection, energy storage regulation, active power management, and grid support, in addition to a synchronization algorithm and power quality control, in order to achieve their objectives. These functions are required by grid codes; thus, they must be performed [22]. The goal is for grid-connected PV systems to improve the dynamics of the power system by assisting in the mitigation of faults and the assurance of stability. In addition, monitoring, diagnostic, and predictive functions are novel in high-power PV systems, and they are being introduced for economic and optimal operation reasons. Grid-connected PV systems are more complex to operate as compared to standalone solar PV systems [23]. As a result, as more stringent regulatory standards are applied, control actions grow increasingly complex. In general, controllers can be categorized into three types of categories:

Loops of basic control photovoltaic systems are as follows:

(i) Mandatory restrictions necessitate controls

(ii) Controllers that are more advanced

The transition of the electrical energy system is underway around the world, with consumers and other stakeholders

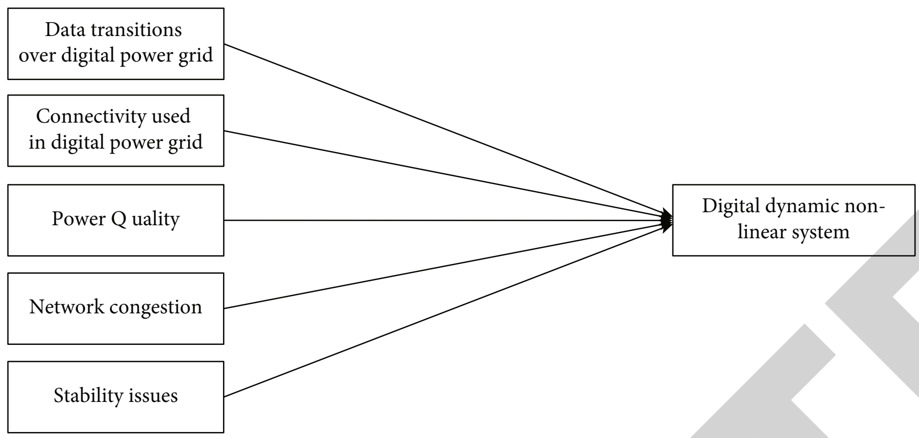

Figure 1: Digital dynamic nonlinear system.

moving from a traditional unidirectional structure to a more open, adjustable, and participatory one [24]. This shift is the result of a variety of factors that vary each country. Since 2010, the electrical industry has witnessed significant changes in the adoption and deployment of new technologies to improve the use and efficiency of power generation, transmission, and distribution. These changes have resulted in the emergence of a larger electrical market in many regions [25]. In previous studies, motivation was defined as meeting demand with the highest level of reliability and quality of service at the lowest possible cost, maintaining the highest level of safety for both people and equipment, and always keeping voltage and frequency values within permissible limits. However, due to the COVID19 pandemic's adverse effects, distribution businesses are putting in a lot of effort to meet consumers' requests for a contemporary electrical system, both in terms of quantity and quality [26]. In this new environment, the operation of distribution systems is based on centralized procedures, with some countries relying on local government and others on private corporations. Electrical systems tend to decentralize distribution companies' decisions to optimize consumer happiness [27]. Electricity is also being used in other energy sectors, such as transportation and heating/cooling, to make the move to more environmentally friendly operations that are more efficient. Heat pumps are preferred by the former over fossil fuel vehicles, while electric vehicles are preferred by the latter over gas-fired heaters in order to reduce greenhouse gas emissions [28].

Distributed energy resources include RESs, EVs, and HPs, which present both obstacles and possibilities for improving distribution network performance [29]. Distribution energy resources (DER) can also change their generating patterns (RES and ESS) as well as their consumption patterns (EVs and flexible loads) in order to provide grid flexibility services [30]. Despite these gains, the widespread use of distributed energy resources in low- and medium-voltage (LV/MV) grids has negative consequences for network operation and power quality [31]. PVs' inconstancy results in rapid voltage fluctuations, whereas EVs' abrupt charging results in voltage sag and unbalance [32]. In order to reduce these negative consequences, network planning and operation must be modified in order to accept distributed energy resources while maintaining network voltage quality, which may include network component reinforcements and power quality supporting the functioning of equipment [33]. An important difference in modeling when analyzing power flow is the use of actual and reactive average power variables that are not physics based to represent loads and generators as opposed to physics based models [34]. The fact that these variables mean the average intensity of time with phasor relationships means that they are not naturally compatible with time domain analysis, which is why they are operating in this order. As a result, time domain analysis is used to analyze the behavior of loads and generators. This analysis either uses physics-based models or some sort of approach to constant power models to identify the behavior of the loads and generators. Models built on the basis of physical laws [35]. The second option is to use the time stamped voltage and current measurements provided by faster measurement units (PMUs), which can be used to characterize the total load, with voltage and current as unknown variables. And the actual measurement data is used to characterize the load [36]. In addition to being noteworthy because it has the ability to serve as the first step in harmonizing steady-state and transient models, it also has the potential to unify power system assessments under a unified framework [37].

A technical term for this process is grid-edge control, and it refers to the control of distributed energy resources at the grid edges that makes use of different data resources that have been created by the digital transformation [38]. Microgrids are becoming more and more commonplace in the United States [39]. The term "microgrid" refers to a system made up of distributed energy resources that are electrically connected and coordinated to serve as self-contained energy sources that can be connected to the utility grid or run independently in the context of energy [9]. It is possible to find research on the control methods for distributed energy resources to support the MG operation in, which focuses on local control with no communication between distributed energy resources [15].

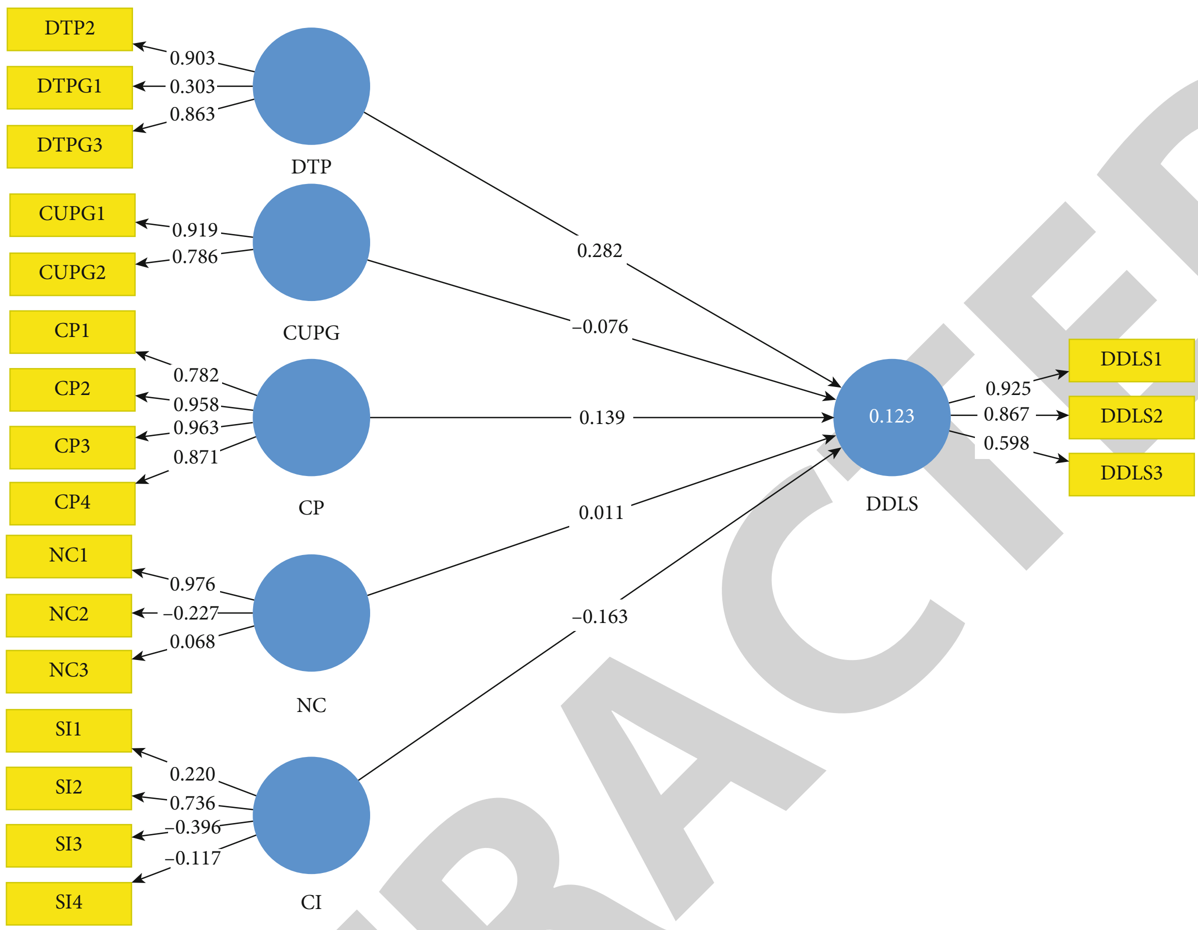

Figure 2: PLS algorithm.

Because distributed energy resources are completely unaware of the overall performance of the system and the condition of other units, network performance optimization is unlikely to be achieved using this technique [32]. In order to satisfy the nation's electrical needs on a short-term basis, primary renewable energy cannot be stored; hence, its power output is only available on a short-term basis [30]. As previously said, system flexibility must be increased in order to ensure that the entire system operates as efficiently as possible [21]. Ensure that there is a sufficient quantity of reserved power from generation-side resources available at the system level to achieve flexibility at the system level. As a result, many power plants are forced to run at power levels that are lower than their rated values or at minimum levels, finally resulting in the use of standby mode [30]. If synergies from related areas are utilized, the potential for growth can be even larger. For example, electrification in the transportation and construction industries, which are represented by electric vehicles and high-performance structures, respectively, can be realized [25]. In order to fully maximize the potential contribution of such flexibility resources to system balance, it is required to design intelligent control mechanisms as well as appropriate incentives. A large amount of money will be necessary for grid strengthening in order to accommodate the growing use of distributed energy resources in any other circumstance [31].

Table 1: The path coefficients.

	DDLS
CI	-0.163
CP	0.139
CUPG	-0.076
DDLS	
DTP	0.282
NC	0.011

3. Methodology

In order to analyze the relationship between the system of digital power grid research and digital dynamic nonlinear system of power system, this study has used the data transitions over digital power grids, connectivity used in digital power grids, power quality, network congestion, and stability issues as independent variables as shown in Figure 1. However, the digital dynamic nonlinear system has been used as the dependent variable. The data was collected using questionnaires, and the data was collected from various digital power grids and solar system users. The collected data was analyzed by using SEM PLS 3. The reliability of the collected data was tested by Cronbach's alpha and the values

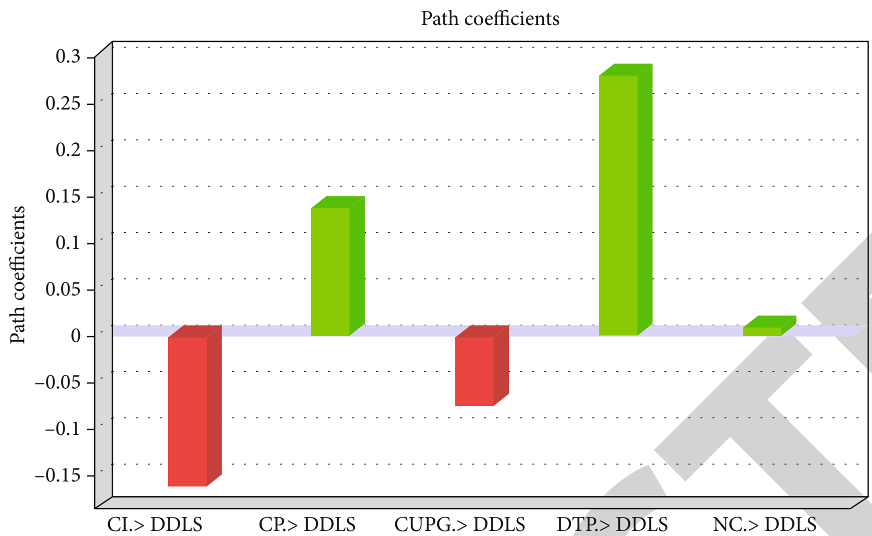

Figure 3: The total effect of latent variables.

above 0.7. The results indicated that there are significant values between the variables.

4. Research Framework

4.1. Analysis and Discussion

4.1.1. PLS Algorithm. The SMART PLS 3 programmed was used to build the PLS algorithm and evaluate the model's fitness for this investigation. Structural equational modeling is used to analyses cross-national cultural communication from the perspective of organizational management. There were three items to measure DTP, two for measuring CUPG, four for measuring CP, three for measuring NC, four for measuring CI, and three for measuring DDLS (DV). The figure two shows that CUPG DDLS as shown in Figure 2.

4.1.2. Path Coefficients. Table 1 shows the path coefficients for the links between the two variables. The *t*-statistics results are between 2 and 2, close to zero, indicating that the collected data is valid and representative. Acceptable *P* values indicate a link between variables. Below, Figure 3 shows the total effect of latent variables on each other. Only CI→DDLS, and CUPG→DDLS shows negative paths.

4.1.3. Latent Variable Correlations. Table 2 on the right shows the correlation between the factors. As a result, the findings demonstrated that components are related in a good way. The data show a negative moderate association between CI and CUPG, with a -11.9 percent impact on each other. According to the data, there was a significant negative connection between CUPG and -(17.7%), as well as a negative association between DTP and CI (-7.8%) and a negative association between CI and NC (-13.5%).

4.1.4. LV Descriptives. In terms of their value, Table 3 underneath shows the importance of descriptive and latent variables. The data show that the descriptive statistics table's min and max values are between -2 and 5 and indicate that the value is within the acceptable range of 2 and 5. Skewness values range from 1 to +1, negatively distorted variables are reasonably symmetric and acceptable, and positively distorted variables are moderately symmetric and inappropriate. Since the values of the variables have negative skewness, they are probably distorted to the left, with a median and mean that is smaller than the mode of the variable.

Table 2: The correlation between the factors.

	CI	CP	CUPG	DDLS	DTP	NC
CI	1.000	0.006	-0.119	-0.177	-0.078	-0.135
CP	0.006	1.000	0.110	0.176	0.142	0.622
CUPG	-0.119	0.110	1.000	0.110	0.541	-0.106
DDLS	-0.177	0.176	0.110	1.000	0.273	0.129
DTP	-0.078	0.142	0.541	0.273	1.000	0.007
NC	-0.135	0.622	-0.106	0.129	0.007	1.000

Table 3: The importance of descriptive and latent variables.

	Median	Min	Max	Excess kurtosis	Skewness
CI	0.193	-2.969	1.530	1.241	-1.032
CP	0.433	-1.773	1.073	-1.174	-0.623
CUPG	0.119	-2.206	2.444	-0.617	0.059
DDLS	0.263	-3.181	1.566	1.331	-0.732
DTP	0.017	-1.972	2.108	-0.865	0.001
NC	0.318	-1.660	1.664	-1.304	-0.144

Table 4: The residual correlation of the inner model.

	DDLS
DDLS	1.000

4.1.5. Inner Model Residual Correlation. According to the residual correlation of the inner model, DDLS showed strong positive correlation, with the link between the

Table 5: The rest of the description of the internal model.

	Mean	Median	Min	Max	Standard deviation	Excess kurtosis	Skewness
DDLS	0.000	0.000	-2.678	1.696	0.936	1.033	-0.713

variables changing with a degree of 100.0%, as shown in Table 4 underneath.

4.1.6. Inner Model Residual Descriptives. Table 5 shows the rest of the description of the internal model. The minimum and maximum values for CNEC and CT shown in the table are 2 and 5, respectively. We asked a total of 100 people for their opinions. Skewness and kurtosis measurements are close to zero and range from 1 to 1 indicating that the data is valid and unbiased. In DDLS, the curve is negatively sloping. That is, the longer side of the curve is on the left. On the other hand, SI is just distorted. That is, the longer side of the curve is to the right of the symmetry equation.

5. Quality Criteria

5.1. R Square. The *R*-square value and modified *R*-square for various scenarios are shown in Table 6 below. Data transition over digital power grid (DTP), connectivity used in digital power grid (CDPG), power quality (PQ), network congestion (NC), and stability issues (CI) favorably effects the DDLS (digital dynamic nonlinear system). The results show that the *R*-square value is 0.123, that the current 12.3% values have an adjusted *R*-square of 0.077 and that the 7.70% model fit for the DDLS study is demonstrated.

5.2. f Square. The value of f-square is shown in Table 7 below. In a research model with an endogenous variable, the f-square displays the variations in *R* square. The table below illustrates that if an endogenous variable changes, the link between DDLS will change negatively with a very low ratio of 0.029 percent of change in CI. However, as shown in the table below, if an endogenous variable changes in the relationship between DDLS and DTP, it will result in a positive change of 0.063 (6.3%) (which is a weak change).

5.3. Construct Reliability and Validity. Table 8 below shows the reliability of the structure and the validity of the study. Cronbach's alpha is above 0.70 in reliability analysis. (This shows that the data obtained for the study is accurate and acceptable.) Due to the small number of measurement points, the CUPG score (connectivity used in digital power grids) is 0.672, which is sufficient for a limited number of measurement points. The rhoA value reflects the combined reliability rate, and the results show the mean variance of all the variables included in the study [29]. Figure 4 above shows a graphical representation of composite reliability. Therefore, the combined reliability evaluation of hidden variables is also evaluated as satisfactory. 0190 shows that the mean variance of the CI acquisitions is inadequate, and the mean variance of the data is 19.0 percent of the variance extraction.

Table 6: The *R*-square value.

	R Square	*R* Square adjusted
DDLS	0.123	0.077

Table 7: The value of f-square.

	DDLS
CI	0.029
CP	0.012
CUPG	0.004
DDLS	
DTP	0.063
NC	0.000

Table 8: The reliability of the structure and the validity of the study.

	Cronbach's alpha	rho_ A	Composite reliability	Average variance extracted (AVE)
CI	0.935	-2.147	0.057	0.190
CP	0.925	1.075	0.942	0.804
CUPG	0.672	0.736	0.844	0.731
DDLS	0.718	0.767	0.847	0.655
DTP	0.888	0.780	0.760	0.551
NC	0.913	-0.199	0.251	0.336

6. Discriminant Validity

6.1. Fornell-Larcker Criterion. Table 9 below shows the Fornell-Larcker criteria (FLC) analyzed in the survey. It is used to find out how much CI, CP, CUPG, DDLS, DTP, and NC are influenced by each other. With respect to their relative ratios, the results show that the variables have a positive ratio variance. The degree of common variance between variables in this situation is 0.622 (CP→NC). This means that the variance between variables changes by 62.2 percent with each change in CP unit (which is a big change). However, CI→CUPG (-0.119), CI→DDLS (-0.177), CI→DTP (-0.078), CI→NC (-0.135), and CUPG→NC (-0.106) show that if one variable change it will negatively affect the results of another variable.

6.2. Heterotrait-Monotrait Ratio (HTMT). The heterotrait-monotrait ratio (HTMT) value is used to determine if a variable is discriminatively valid (see table and figure below). This reflects how similar the latent variables are to each other. As a result of the findings, the link will have 0.144 (14.4%) same validity if CI (stability issues) and CP (power quality) are comparable. The highest validity between CUPG

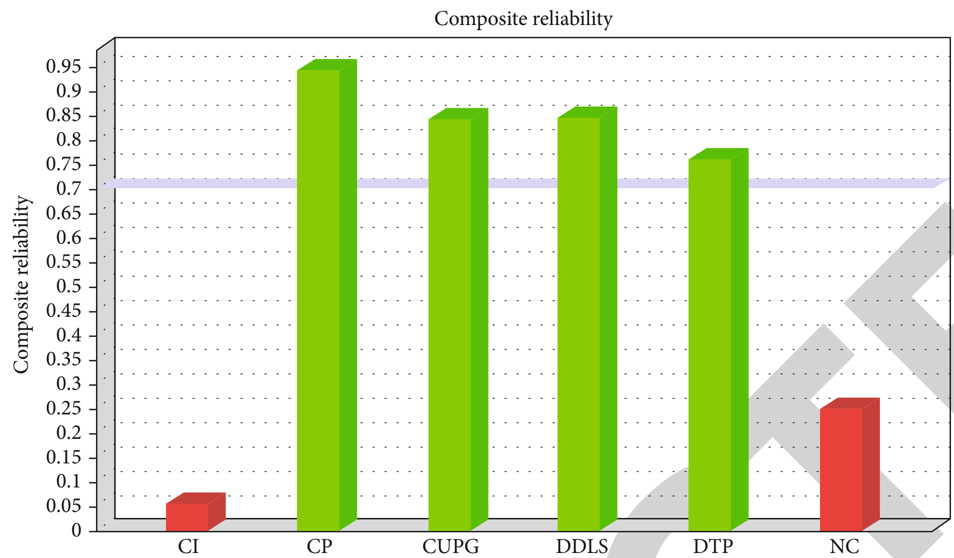

Figure 4: A graphical representation of composite reliability.

Table 9: The Fornell-Larcker criteria (FLC) analyzed in the survey.

	CI	CP	CUPG	DDLS	DTP	NC
CI	0.436					
CP	0.006	0.897				
CUPG	-0.119	0.110	0.855			
DDLS	-0.177	0.176	0.110	0.809		
DTP	-0.078	0.142	0.541	0.273	0.742	
NC	-0.135	0.622	-0.106	0.129	0.007	0.580

Table 10: The heterotrait-monotrait ratio (HTMT) value.

	CI	CP	CUPG	DDLS	DTP
CI					
CP	0.144				
CUPG	0.411	0.139			
DDLS	0.163	0.186	0.163		
DTP	0.396	0.171	1.033	0.412	
NC	1.166	0.603	0.191	0.176	0.110

and CI (16.3%), DDLS and CI (39.6%), and NC and CI are represented in this graph (1.166).

The values of other latent variables, which correlate to the values in Table 10, are shown in Figure 5 below. The variables' validity score was positive, indicating that the relationships between them were acknowledged. The relationship between all variables was found to have significant validity. However, the association between DTP→CUPG and NC→CI is shown invalid in the graph given below.

7. Collinearity Statistics (VIF)

7.1. Outer VIF Values. Table 11 shows the outer VIF values for the survey items used to measure the variables. Statistical studies of colinearity between all items used to measure variables are represented by outer VIF values. As a result, the data show that the VIF rate values range from 1 to 10 on a scale of 1 to 10. Consider the following scenario. CP3 has the highest outer VIF value of 4.998 and NC1 (first question from network congestion) has the lowest outer VIF value of 1.092. The outer VIF value shows the correlation between items and variables. As a result, the results in the table below show that all items are positively related to hidden variables.

7.2. Inner VIF Values. The values of the inner VIFs of the variables in relation to the measuring items are shown in Table 12 below. As a result, the VIF values of the variables are within acceptable limits.

7.3. Construct Crossvalidated Redundancy. The structural equation modeling (SEM) of system for digital power grid has long been used to make predictions about future outcomes. Even though they are regarded as their "niches," empirical research investigations have revealed a striking trend in which the approach is being used in an increasingly diverse range of applications. Q^2 is obtained by the application of the blindfolding procedure in SEM PLS 3, which is a sample reuse strategy that omits each piece of data and then utilizes the resulting estimate to anticipate the missing part of the data. Endogenous latent constructs with reflecting measurement models are the only ones that are subjected to the blindfolding technique as shown in Table 13. When attempting to estimate Q^2, the DDLS measurement for a particular endogenous latent structure must be greater than 0.00. This is interpreted as a predictive or descriptive association of potential extrinsic structures. The endogenous structure considered must be greater than 0. Table 14 of crossconstruct validated communality shows the Q^2 values greater than 0, only the value of CI (stability issues) and NC (network congestion) is less than 0; therefore, their Q^2 validation was rejected.

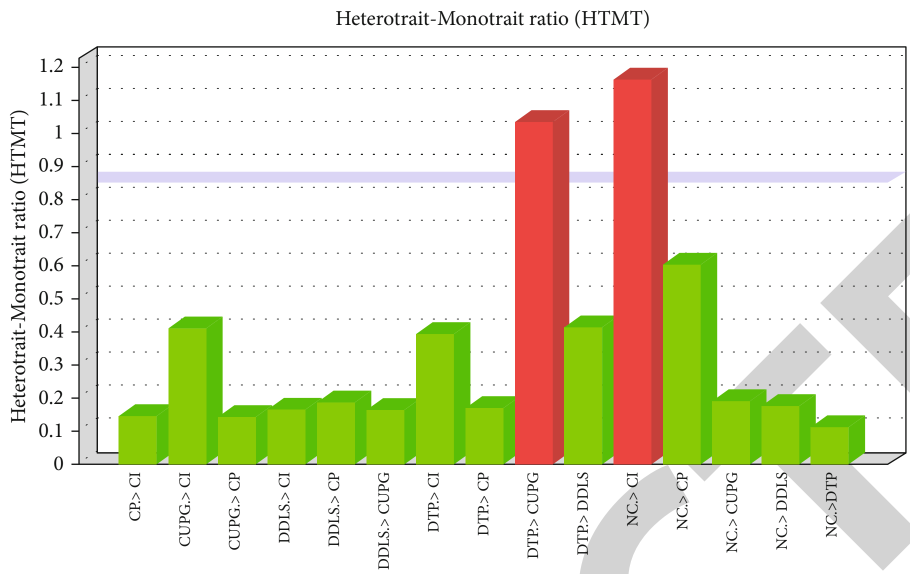

Figure 5: The Heterotrait-monotrait ratio (HTMT).

Table 11: The outer VIF values for the survey items used to measure the variables.

	VIF		VIF		VIF
CP1	2.569	DDLS2	2.630	NC3	1.557
CP2	4.998	DDLS3	1.168	SI1	2.014
CP3	5.825	DTP2	1.489	SI2	1.913
CP4	3.407	DTPG1	1.113	SI3	1.114
CUPG1	1.297	DTPG3	1.625	SI4	1.322
CUPG2	1.297	NC1	1.092		
DDLS1	2.881	NC2	1.472		

Table 12: The values of the inner VIFs of the variables in relation to the measuring items.

	DDLS
CI	1.062
CP	1.767
CUPG	1.502
DDLS	
DTP	1.428
NC	1.798

Table 13: The Q^2 values.

	SSO	SSE	Q^2 (=1-SSE/SSO)
DDLS	300.000	289.998	0.033

7.4. Construct Crossvalidated communality

7.4.1. Model Fit

(1) Fit Summary. In Table 15, the summary of model fitness is presented, and the findings are presented in the following table. It shows how to perform model fitness analysis using saturated and inferred models. The SRMR score of the saturated model is 0.171, which implies that it is 17.1 percent appropriate for analysis, according to the model (moderate-valid fitness).

Table 14: Construct crossvalidated communality.

	SSO	SSE	Q^2 (=1-SSE/SSO)
CI	400.000	464.219	-0.161
CP	400.000	143.693	0.641
CUPG	200.000	160.185	0.199
DDLS	300.000	198.897	0.337
DTP	300.000	231.933	0.227
NC	300.000	317.125	-0.057

Table 15: The summary of model fitness.

	Saturated model	Estimated model
SRMR	0.171	0.171
d_ULS	5.559	5.559
d_G	1.425	1.425
Chi-square	656.037	656.037
NFI	0.437	0.437

Table 16: rms theta.

rms theta	0.274

As a result of this, the rate in the estimated model is 0.171, which also reveals that the variables have similar fitness analyses. It is discovered by computing the d-ULS data that the rate is 5.559 percent. This rate indicates the positive effects of DTP, CUPG, CP, NC, and CI has a fit effect of on DDLS.

Table 17: The fitness of model selection criteria.

	AIC (Akaike's information criterion)	AICu (unbiased Akaike's information criterion)	AICc (corrected Akaike's information criterion)	BIC (Bayesian information criteria)	HQ (Hannan Quinn criterion)	HQc (corrected Hannan-Quinn criterion)
DDLS	-2.158	4.029	101.059	13.473	4.168	5.762

(2) rms Theta. It is shown in Table 16 below that rms theta is used. These results are shown in this table as the root mean square residual covariance of the residuals of the external model of the variable. An RMS theta equal to 0.274 is calculated to be optimal for 27.4 percent of the external model.

7.4.2. Model Selection Criteria. Table 17 underneath shows the fitness of model selection criteria underneath. The criteria are built against a dependent variable (DDLS). The value of Akaike's information criterion correction assumes the same predictor for training and verification, so the prediction error of the random predictor is underestimated compared to traditional correction. You can calculate the adjusted AIC of a regression model with a mixture of random and fixed predictors.

8. Conclusion

The digital power grid is the most complex system on the planet, and they serve a key role in the modern culture in which they are installed. A direct impact on modernization and the political, social, and economic aspects of society is made by digital power grids. In order to keep such systems running well, it is required to utilize a number of control and protection techniques. Power outages and unanticipated incidents, on the other hand, are prevented by the numerous preventive measures built into modern systems. Moreover, with proper management of the digital transition and the inherent controllability of distributed energy resources, the cost-effectiveness of incorporating distributed energy resources into the grid should be maximized, while system stability and reliability should be maintained or improved. Digital power grid systems are utilized to maintain stability and ensure a continuous supply of electrical energy to clients because of their ability to respond swiftly in the event of a power outage or other interruption. However, unpredictable failures and cascading accidents occur regularly, resulting in a blackout that can cause significant disruption to modern life. This study has utilized data transitions over digital power grids, connectivity used in digital power grids, power quality, network congestion, and stability issues as independent variables. However, the digital dynamic nonlinear system has been used as the dependent variable.

8.1. Recommendations. The following are the recommendations of the study:

(i) In the future, the study could develop an applied numerical algorithm for the power system

(ii) This study could specifically use the approaches of UVLS (ultravoltage load shedding) and UFLS (underfrequency load shedding)

(iii) The future studies can also discuss the gap between demand persist and generation for the use the system of digital power grid

(iv) Furthermore, to develop a numerical algorithm, this study can also discuss frequency domain and time domain of power system

Data Availability

Data is available on request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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