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Green Eco-Safety Controlled via Grey Conceptual Framework Integrated with backcasting Approach Managed through Key Enabling Technologies

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Abstract:- Global warming is a problem that threatens the survival of social peace. The nations' economies must balance the TBL's elements via targeting the reduction of carbonic emissions and the depletion of natural resources. Therefore, called on relevant U.N. to adopt the visual control platforms via using KET (Key Enabling Technologies) to manage a proposed conceptual framework (green eco safety control; GESC) through 12 essential related significant sustainability indicators (L_i). GESC consists of two sequential phases; the first determines the organization's vision values for significant indicators and choosing the suitable policies to achieve sustainability by the backcasting technique (ABCDE), that supported by the grey methods (AGO and IAGO) to create a referenced curve that ties the future value and that measured to control the eco safety at the second phase. The climate summit pays attention to measuring this index online. This platform records the energy-intensive consumption for 21 organizations, proposes a future vision, and then uses the grey method to build the visual control curve. The visual and online control enhance the targets by 37% and 14%, respectively.

***Keywords**:- Visual Control; Online Control; Green Production; KET Utilization; Sustainability Indicators; Backcasting Approach; Grey Methods.*

I. INTRODUCTION

The generating electricity companies are the primary source of environmental pollution in developing countries, mainly if they use coke to generate energy, significantly impacting human immunity, physical health, and economic development. As a result, developing techniques for measureing eco safety infractions is critical to maintaining a safe climatic level. According to the literature, several attempts have been made to record eco-safety observations, mostly partially focused on regression analysis. Still, entire control techniques are scarce, particularly in the Middle East. This study describes a KET innovative control methodology based on continuous precise monitoring. Backcasting approach is preferred to specify and set values represent a future vision for specific in which the measurement standard for a desired future vision is determined. Therefore, the gap between the current (as-is) situation and the future value (to-be) is supported by prediction through the steps of the grey methods. The authors consider the generated predictive curve as a reference for controlling reality monitoring for measured values of specific indicators (i.e., via one of KET). It becomes a limit that we do not cross from below for everything desirable and vice versa in everything not desirable. Backcasting identifies the suitable policies for achieving specific vision serves a national issue, via defining related indicators and setting future value for each one, and use the grey model to build a reference curve and build the actual fitting line in time series count the deviation to justify or modify their policies. This approach monitors an eco safety issue for electricity consumption that needs intensive coal energy to generate gigawatt.

The coefficient of determination and other statistical characteristics are used to measure the model's efficiency, and the findings demonstrate high agreement between observed data and computed values in both cases. Furthermore, it compared the suggested framework to a traditional statistical one and proved its better capabilities. The simulations were carried out utilizing a user-friendly software program designed originally. The paper is spotlighting the emerging debate on capitalizing on the 4th Industrial Revolution (i.e., Industry 4.0) and Key Enabling Technologies (KET: A.I., Augmented reality, Cyber security, IoT, autonomous and robots machines, Cloud, simulation system, cyber-physical systems, inter-machine communication M2M, and Big data analysis [16]) production change in projects related to eco safety at the local level, and how will measure the emission level in respecting sustainability. The novelty of this work is to aggregate the famous indicators related to maintaining TBL (i.e., triple bottom line; Planet, People, and Profits [10]) balanced, which are regarded the (C.E.; Circular Economy) transition's primary drivers [33]. Therefore, the authors aim to develop the Local Productive Life Systems (i.e., LPLS) model by creating a conceptual framework that juxtaposes the online monitoring and control, which suggests possible pathways initiate to adopt more equitable and clean outcomes (i.e., green [30]).

In generating electricity companies, sustainable production is commonly considered a significant concern. The focus of this research is to investigate the variables [9], as well as the relationships between those variables and the eagerness to implement them (management eagerness), and tactical (Allocation of resources), and (safety and emission) levels among generating electricity companies [2, 5, 11, and 39]. The findings reveal that 'internal variables' have driven and stimulated generating electricity companies to pursue sustainable production methods and policies rather than 'external variables' [35]. This article focuses on electricity companies to follow the monoxide emissions. The blast furnace work based on the streaming of hot air enters through the blowing tubes located below it, where the oxygen reacts with the coal (coke) to form carbon mono and dioxide CO, CO2, which is transformed during the reduction of dioxide carbon [45]. The emission of carbon dioxide causes climate change by coal consumption. In 2020 [17], coal-fired factories and stations were the most significant worldwide contributor to the increase in carbon dioxide emissions, accounting for 43% of all fossil fuel emissions and almost 25% of all emissions. Coal-fired electric power plants produce around a tonne of carbon dioxide per megawatt-hour generated, about double the 500 kg emitted by natural gas-fired power plants. Many generating electricity companies based on coal in their outputs, were consumption were 14.5 gigatonnes in 2020. If countries fail to keep their climate below 2.5°C, hundreds, if not thousands, of coal-fired power facilities would have to be shut down [42]. There is no escaping the need to reduce global warming while maintaining a reduction in production costs. Suppose the use of coal to generate the electricity needed for production is a necessity linked to reducing costs at the status quo. In that case, we must adjust the policies, mechanization, and maintenance to reduce the risks of global warming [27].

Backcasting, a concept invented by John B. Robinson In the '80s of the last century, describes the technique's basics that determine the description of a specific future circumstance. It then entails an imaginative journey backward in time, in as many phases as required, from the future to the present, to illustrate the process by which one may achieve that specific future from the present [42]. The findings will be beneficial in designing a platform for sustainability management in the generating electricity companies, which will take a step-by-step approach supported by grey methods by identifying the variables that inspire and enable sustainable production.

II. PHASE-I; PLATFORM FORMULATION USING A BACKCASTING APPROACH

Backcasting is a method of planning that begins with defining an ideal future for a bandle of factors and then works backward to discover policies that will link that hopeful future to the present. This approach is accomplished by applying the forecasting algorithm to the data series from beginning to end. It was found that the more the use of natural resources, the higher the amount of damaging carbon emissions, and that the density of polluted air increased the speed of sound, especially for expanding the air temperatures. As a result, the audio signal indicator was developed as a criterion for determining the extent of the damage (i.e., deviation).

The authors suppose the most suitable measure for eco safety emissions in their streams via sound wave deployment to determine the impact $L_{ieq} \leq X_i$ or not (the maximum accepted value for every indicator X_i As the Summit climate recommended, especially monoxide carbonic emissions of operation machine, were the ideal speed 332.2 m/s). According to the violating of levels of all aggregated indicators, each indicator fluctuates up and down as to L_{ieq}. Each indication is represented as a noisy source impacting continuous eco safety stability that includes the desired impact as the observed source with fluctuating (i.e., frequency) its value over a specific period 'T' (week) for specific Area 'A' (km^2) populated by 10000 people 'P' through its wavelength, for several discrete measurements (N) and expressed by following equ-1:

$$L_{ieq} = 10\ log_{10}\left(\frac{A}{T}\sum_{Li=1}^{N} 10^{\frac{L_i}{P_w}} - \sum_{Li=1}^{N} \ln(\lambda) - \sum_{Li=1}^{N} \ln(\beta) + \sum_{Li=1}^{N} \ln(\Omega)\right) + \boldsymbol{e} \leq X_i \ldots (1)$$

The error in the equ-1 is $\boldsymbol{e}$ (express other numbers of biota at specific area), where $L_i s$ are the impact of the indicators, corresponding to ith measurements and computed via polynomial equ-2.

$$L_{ieq} = \sum_{i=1}^{N} N_i * T * A * log\left(\frac{L_i}{P_w}\right) + e \ldots (2)$$

Understanding the functional link between the equivalent and influential indicators is vital to monitoring the decreasing eco safety violations. L_{ieq} is linked to various factors, including the productivity of generating electricity companies enterprises, their working hours, energy consumed in production, trash disposal techniques, and final waste destinations. As already stated in the beginning. A brief description of how these variables were verified by e-mailing 100 organizations and measured by a large team that classified the measurements into related clusters, found the best centroid and took into account L_{ieq}. Also, the activities' uptime A_{sk}(t) (the period of measurement), It keeps track of some of the statistically significant deviation valu es σs (deviation span). The σs and k represent the deviation span at this point, which has the highest possibility of deviation appearing. Fault occurrences produce them (i.e., the deviation is regarded as a mirror for the malfunction of policies implementations). The sound dispersion, on the other hand, is proportional to the variance that arises in these activities cycle time ds $d_{sk}(t) = d_{sk}^0 + d_s\ (t + \Delta t)$ and directly looted effort without any VA. d_{sk} represent the σs that appeared from the predecessor step in the same measurement. The approach for measureing 'visual sustainability' or 'sustainable production efficiency' is not standardized. There is no textbook version available visual sustainability control that is widely acknowledged and appropriate across geographies and sectors of the TBL components [15]. The proposed GESC platform follow the backcasting technique (i.e., which is chosen because a specific result, namely the sustainability vision [16, 26], is prioritized), which beginning with vision, then compares it to existing reality (the norm-datum), brainstorms ideas, and selects a course of action (platform). The proposed approach takes five stages as illustrated in Figure-1: **(A)** Aspirational Identification for success via safety level in the system; **(B)** Norm describes the "as-is" situation and its conditions and detects the hiatus/void among them and the proposed aspirational vision; **(C)** The compliance level towards espouse ideal solutions and to pass the gaps, and **(D)** Select which inventive linkage ideas match with backcasting requirements to implement as pathways from the norm-datum to the vision, **(E)** manages all aggregated data via IoT using a proposed platform. This formulation follows the example of Kim's platform ping process stages two through five, particularly in identifying common themes, a laser focus, prioritized features that support sustainability vision, considering how selected solutions would meet requirements, and laying out platform control in timelines [19].

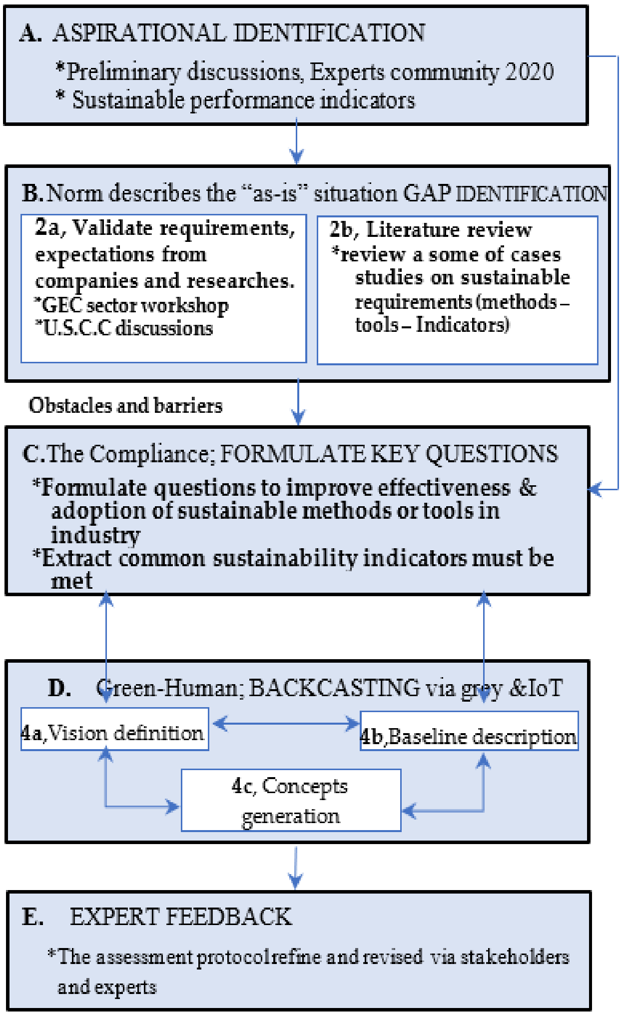

Figure-1. Overview of the conceptual framework

Backcasting using the 'ABCDE' stages (i.e., envision) with great desires rather than safe, attainable objectives for each indicator. Our ambitious objective is for all enterprises to have a long-haul safety emission plan fully perfected into product production processes in green precautions (meant to their products and services) without layoffs, no harm to the environment [35], and social health. Figure-2 illustrates the integration of the next four requirements in designing a platform for a sustainability vision.

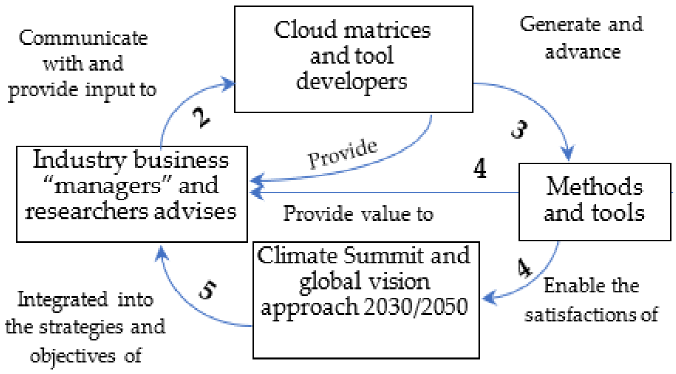

Figure-2. Phase's diagram of desired vision map

A. The proposed conceptual framework matrices

This section aims to make sure of understanding better the influencing variables of achieving sustainability according to the ambit eco-Safety-system (ESS) policies from three perspectives as illustrated in (Figure-3): Management (M), Internal (I.S.), and external safety variables (E.S.). The driving above variables may influence management's desire to include sustainable production as part of its strategy by spending necessary resources. Thus, we hypothesize:

H_1: reflect correlation direction of ESS variables and the eagerness of management to adopt sustainable vision strategies in their production operations.
H_2: reflect correlation direction ESS variables and the standby of organizations (generating electricity companies)

ESS from management (i.e., ESSM); Safety and emission are driving variables from top management, as evaluated by issues about top management interest and supporting policies adopted.

ESS by Internal variables(i.e., ESSI); Internal variables concerned by the operation activities included aspects related to internal resources, such as financial support, knowledge, infrastructure to support business operations, external competition, reputation, and effective performance monitoring [28].

Variables from External (i.e., ESSE); External variables included components related to rules and regulations in the country where the business operates and public pressure pressing the organization to give back to the community.
Standby (i.e., St); In sustainable production, management standby is measured by standby and use of resources, which was tested using comparable but simplified items like those used for safety and emission.

Current Practice (i.e., C.P.); Respondents were asked to rate their companies' perceptions of sustainability production via monitoring the pollutions emissions. Therefore, according to St and CP., the significant objects that should be followed and controlled to reduce these emissions are valve plate thickness, crankcase ($< 0.2\ \mu$) to safe the sound wave in permission able values, where the monoxide carbonic surface thickness should be below 1.05 *mm*, while the discharge orifice of valves radius at 3.0 *mm*, and the discharge orifice of the crankcase is 2.025 *mm* to prevent the evaporative gas emissions (all these values with tolerance in µm) as illustrated in Figure-3 (a, b,c). The functional operation is based on three factors: the revolvable station speed measured by rpm, which recommends constant acceleration and the quality of finish, and average altitude path of 21.4 *mpm*, then need 457: 459 *rpm*, the last is the fuel feed rate which depends on the altitude path length [8 cm^3: 12 cm^3], and the last is the recommended valve thickness (e.g., small scale). All these factors are monitored via SCADA, plc, and sensors.

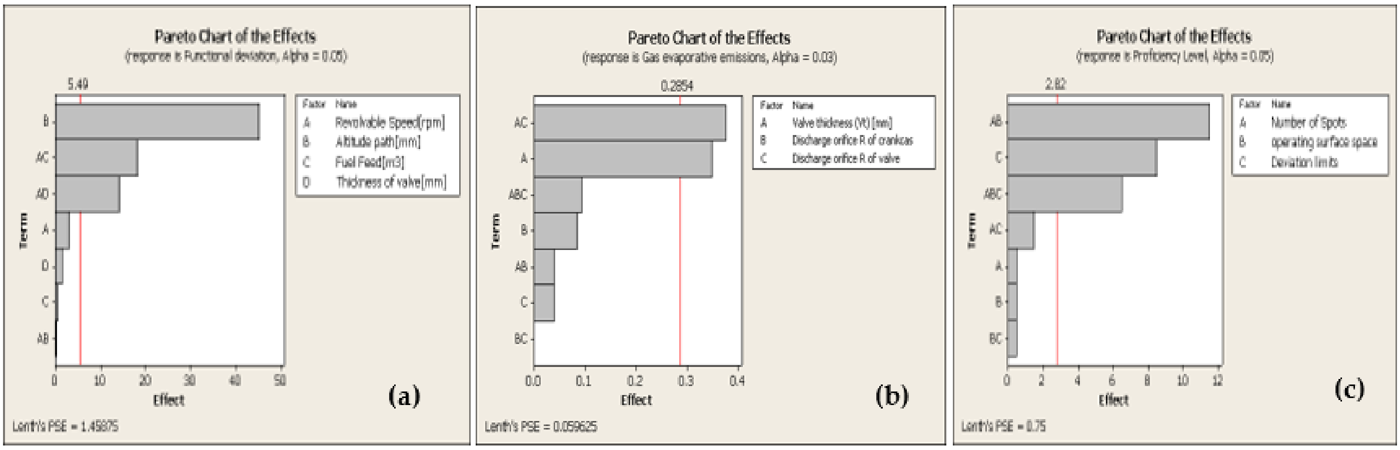

Figure-3: The clues of emissions causes and them relevant

III. PHASE-II: THE INDICATORS VALUES BACKWARD ESTIMATION

Table-1 shows the leading backcasting indicators to achieve the future vision. The proposed conceptual framework, as illustrated in Figure-4, discusses the integration of backcasting approach with grey methods to sketch reference curve tie the present with future vision goal for desirable target, via estimating the e values (deviation) according to equ-2 for each indicator by the grey methods via a technique changing random raw data and generates some in-between values via the two grey techniques and so on. The first is AGO (i.e., Accumulated Generating Operation) is a function that generates some values based on accumulating computed values of L_{ieq} to produce a new line in the gap of the observed and measured data, the second is IAGO (i.e., Inverse Accumulated Generating Operation) which is a method used to extract some of the predictive values from all aggregated values and has already been transformed into AGO.

A. Safety and Sustainability variables

Table-1. The backcasting establishing indicators and relative monitoring impacted object.

	Policies and strategies	***Controlled object***	***Significant factors***	***Code***
1.	Policy support	1-Valve plate 2-Crankcase 3-Surface thickness 4-Discharge orifice of valves plate R 5-Discharge orifice of crankcases R	1-Revolvable speed 2-Quality of finish 3-Average altitude path 4-Fuel feed rate 5- Valve thickness ofaccumulation of pollutants	***ESS. 1***
2.	Enough financial resources			***ESS. 2***
3.	Expertise and specific knowledge			***ESS. 3***
4.	Well-developed infrastructure			***ESS. 4***
5.	To keep track of the performance, you'll need a good measurement system			***ESS. 5***
6.	The country's rules and regulations, as well as worldwide trends			***ESS. 6***
7.	worldwide trend and external requirement			***ESS. 7***
8.	Pressure from society to give to the community			***ESS. 8***
	B. **Eagerness variables**			
1.	Top management's eagerness to drive for long-term growth	1- working hours 2- energy consumed 3- trash disposal 4- final waste destinations		***E1***
2.	Assisting with policy and strategy formulation			***E2***
3.	Financial resources sufficient for long-term growth			***E3***
4.	The use of specific knowledge and skill is made			***E4***
5.	Internal infrastructure enabling			***E5***
6.	Contributing to the community is a company policy.			***E6***

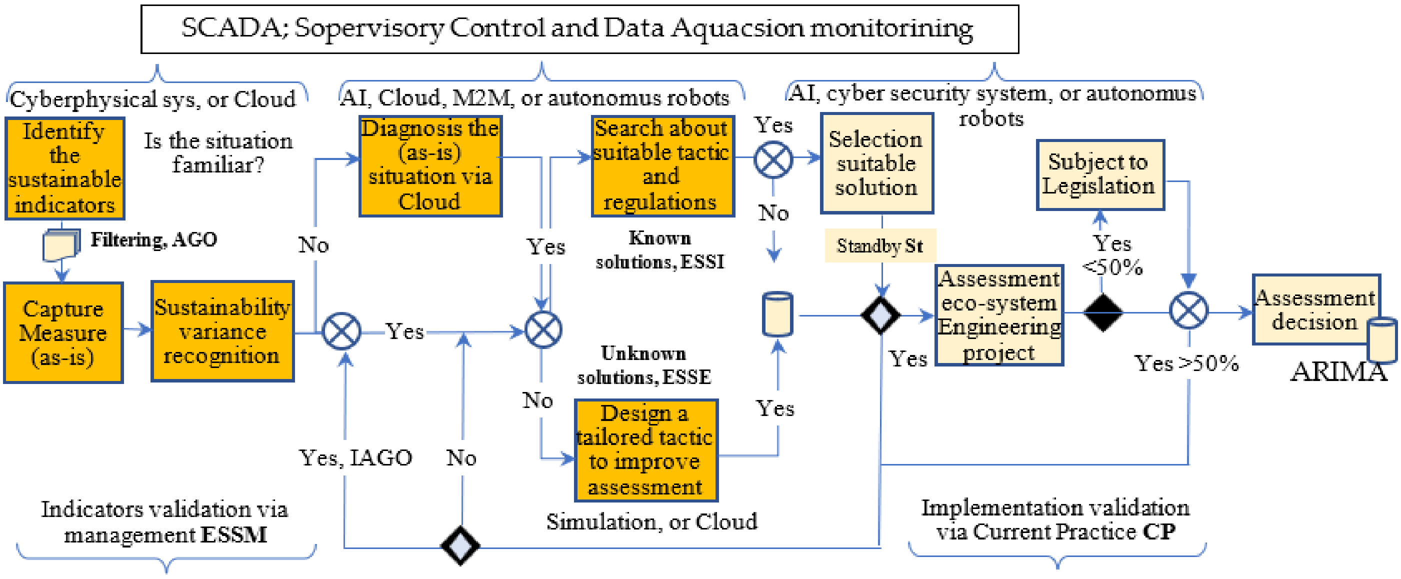

Figure-4: The Proposed backcasting steps, grey controlled in an operational based on I4.0 KET
feedback decision, divergence decision, dataset, filter

➢ *How should estimate Eco safety indicator values?*

Even though the design and management literature has hundreds of cases specialized in optimizing the objective via the grey method on what practitioners value in them [6, 29], the following steps can be used to do grey estimating steps for each indicator by the G.M. (1,1) process.

- *Aggregate a unique data set based on a time sequence during period T.*

$$L_{ieq}{}^{(0)} = \left(L_{ieq}{}^{(0)}(1), L_{ieq}{}^{(0)}(2), L_{ieq}{}^{(0)}(3), \ldots, L_{ieq}{}^{(0)}(v)\right), \ldots \forall v \geq 4 \ldots (3)$$

- To create an operation, start with the first accumulation order (deferential), at $L_{ieq}^{(0)}$, which may get a predictable value L_{ieq} series of the first grey path, formulated as:

$$L_{ieq}{}^{(1)} = \left(L_{ieq}{}^{(1)}(1), L_{ieq}{}^{(1)}(2), L_{ieq}{}^{(1)}(3), \ldots, L_{ieq}{}^{(1)}(v)\right), \forall v \geq 4 \ldots (4)$$

With

$$L_{ieq}^{(n)}(v) = \sum_{iq=1}^{v} L_{ieq}^{(n-1)}(i), v = n, n-1, \ldots, 2$$

- Compute the rear values of $e^{(n-1)}(v) = 0.5\left(L_{ieq}^{(n-1)}(v-1) + L_{ieq}{}^{(n-1)}(v)\right), \forall v = n, n-1, \ldots, 2 \ldots (5)$

- After that, each pair of v for a specific indicator $L_{ieq}^{(n)}(v)$ and $e^{(n-1)}(v)$, are configured for first differential of grey G.M. (1,1), where should identify the first grey order differential equation as

$\frac{dL_i{}^{(1)}(v)}{dk} + aL_i{}^{(1)}(v) = \delta$. if integrated to be $\frac{dL_i{}^{(1)}(v)}{dk} + aL_i{}^{(1)}(v) = \delta$ at the interval [v-1, v].

$\int_{v-1}^{v} \frac{dL_i{}^{(1)}}{dv} dv + a\int_{v-1}^{v} L_i{}^{(1)}\, dv = \delta$, then obtain $L_i{}^{(1)}(v) - L_i{}^{(1)}(v-1) + a\int_{v-1}^{v} L_i{}^{(1)}\, dv = \delta$, which formed as:

$L_{ieq}^{n}(v) + a\int_{v-1}^{v} L_i{}^{(n-1)}\, dv = \delta$, and the differential equation is shown as shadow equation

$L_{ieq}^{n}(v) + az^{(n-1)}(v) = \delta$, where $e^{(1)}(v) = \int_{v-1}^{v} L_i{}^{(n-1)}\, dv, \forall v = n, n-1, \ldots 2$ (6)

Hint, The grey input variable is δ, and the developer coefficient is φ

- Use the L.S. estimate to get the parameter values φ and δ, where $\hat{\varphi} = \begin{bmatrix} \varphi \\ \delta \end{bmatrix}$

And $\hat{\varphi} = (B^T B)^{-1} B^T Y \ldots (7)$

With

$$Y = \begin{bmatrix} x^{(n)}(n) \\ \vdots \\ x^{(n)}(3) \\ x^{(n)}(2) \end{bmatrix} \text{ and } B = \begin{bmatrix} -Z^{(n-1)}(2) \ldots & 1 \\ \vdots & \\ -Z^{(n-1)}(3) \ldots & 1 \\ -Z^{(n-1)}(n) \ldots & 1 \end{bmatrix} \ldots (8),$$

- The initial circumstance such as $x^{(n-1)}(1) = x^{(n)}(1)$, the estimated value of the G(1,1) differential equation GM (1,1):

$\widehat{L_i}^{(n-1)}(V) = \left(L_{ieq}^{n}(1) - {}^{\delta}/_{\varphi}\right)e^{-\delta(v-1)} + {}^{\delta}/_{\varphi}, \forall v = 2, 3, \ldots n$ (9),

- Use (IAGO) to check the estimation value of studying indicator $\widehat{L_\iota}^{(0)}(v)$, where $\widehat{L_\iota}^{(0)}(v) = \widehat{L_\iota}^{(1)}(v) - \widehat{L_\iota}^{(1)}(v-1), \forall v = n, n-1, \dots, 2$ (10),

According to his well-respected advice, Salih Ceylan [34] discovered successful eco safety control necessitates compatibility of an organization's social norms, chance to innovate, codification (typically supplied by legislation), and epistemic creeds at every country when studying the standby of Middle East to sustainable vision achievement. As a result, the most effective cases combine practical usefulness with a cheap implementation cost. When sustainability approaches significantly reduce costs [3, 40], which has become vital to develop via integrating the cloud computing revolution, IoT, and A.I. as recommended (Figure-4).

- *Monitoring Accuracy and Reliability;*

To examine the accuracy of each indicator's estimates, check by the Relative Percentage Error e just using actual values of both pro and con errors. Where using the Average Relative Percentage Error to check the accuracy of control for each L_{ieq}. The accuracy standard measures for any indicator is very accurate if ARPE < 10%, and accurate if ARPE among 10-20%, while inaccurate if ARPE > 50% [41]. The accuracy of G.M. (1,1) 92.01%, while the maximum estimated value for any indicator by SES is 86.8%

$$\in (v) = L_i^{(n)}(v) - \widehat{L_\iota}^{(n)}(v), \dots (11)$$

$$RPE(v) = \frac{|\in(v)|}{L_i^{(n)}(v)} \times 100\% \dots (12),$$

$$ARPE = \frac{1}{n-1} \times \sum_{v-2}^{n} \frac{|\in(v)|}{L_i^{(n)}(v)} \dots (13),$$

The estimation accuracy = 100 – ARPE … (14)

hint: ($L_{ieq}^{n}(v)$ =original data value, $\widehat{L_\iota}^{(0)}(v)$ =estimate value, and $|\in(v)|$ = absolute worth of the leftovers)

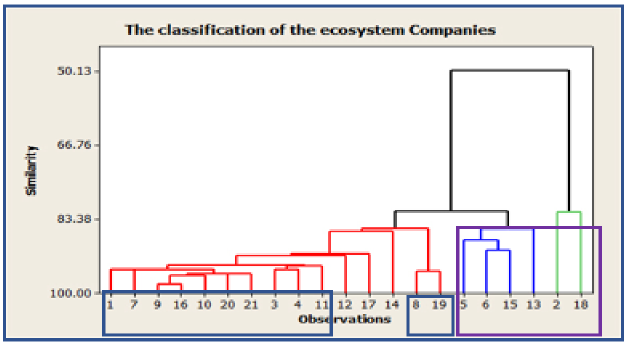

Figure-5: The classification of the Co. ecosystem

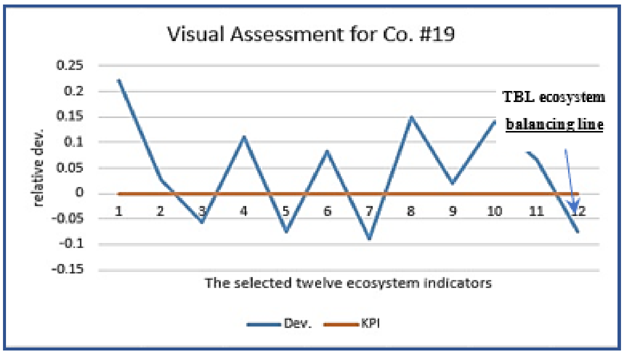

Figure-6: The visual assessment at quarter #3 of study for Co. #19 according the TBL ecosystem values

The average inter-item correlation is used to measure the measurment's reliability (i.e., Cronbach's alpha $\alpha < 0.025$). A high value indicates that the data have a high degree of internal consistency according to GESC=*f*(ESSM, I.E., E.V., CP, St). The organizations' policies to achieve the desired vision have been classified as illustrated in Figure-5, where CP. # 1, 7, 9, 16, 10, 20, 21, 3, 4, 11, 8, and 19 are distinguished in following the eco safety procedures in their operations system. In contrast, CP #5, 6, 15, 13, 2, and 18 cause a deviation. The other CP 12, 17, and 14 may be accepted but not optimal—the visual control monitor and forecasts the twelve measures indicators values for each policy for 21 different companies. Figure-6 illustrates the visual control via the Augmented reality technique for CP # 19 as eco safety. Table-2 shows the sound deployment speed to estimate the dioxide carbon emission rates during energy generated in the generating electricity companies. Table-3 summarizes the average values found in the level of engagement and emission. Table-3 reveals that 'IS. elements' ($\mu = 5.09$) have the greatest value among the motivating variables for implementing a sustainable production plan, whereas 'Management' and 'ES. Variables' are comparably lower (μ= 4.404 and 4.558). The generating electricity companies are classified according to them, respecting eco safety indicators as illustrated in Figure-5. Table-2 indicates the data of deviation's span series values for monoxide carbonic emissions for the specific organization through 72 days (12 days every month), where (σs in Decibel; dB). The deviation according to estimated curve generated by grey method among the future value defined through the middle east vision toward the climate respect. This deviation at policy # 19 indicates the hopeful vision of carbon dioxide reduction before 2030.

Table-2: The deviation σs in Db of L_{ieq} among the real recordation and estimated data via grey

$M/_D$	1	2	3	4	5	6	7	8	9	10	11	12
1	97.3	95.1	94.4	126	143	156	149	149	156	151.2	161	161
2	96	97	99	124	134	142	151	143	155	145	163	163
3	91	90	117	94	136	141	136	154	141	150	139	155
4	94	92	121	95	137	142	142	153	142	156	157	159
5	93	91	125	100	138	150	147	156	150	149	160	163
6	98	122	128	130	160	160	175	185	190	194	197	215

Table-3. Multi trait matrix for backcasting attributes.

	Safety procedures	ESS by Internal Variables	ESS by External Variables	Management eagerness	Standby in terms of Internal
Management ESSM	0.746				
ESS by Internal Variables (ESSI)	0.046	0.888			
ESS by External Variables (ESSE)	0.103	**0.433****	0.701		
Management Eagerness and resources (E)	**0.748****	0.052	0.178	/	
Standby in terms of Internal Measures (St)	-0.167	**0.402****	**0.323****	0.021	0.865
Integration of sustainability	-0.30*	0.256*	0.187	-0.111	**0.42****

*The diagonal is the Cronbach's α for each latent variable. at the same time, other values express the correlation matrix among the pairs of these variables (i.e.,latent) . **, *: p-value and significance range less than 0.01, 0.05 respectively.*

Table-4. The average scores of the ESS variables and eagerness.

Scales	Code	Avg. Scores
A. ESS variables		
Top Management	**ESS M**	4.404
1. Top management responsibilities	ESSM $_1$	4.196
2. Supporting policy	ESSM $_2$	4.612
Internal resources	**ESS I**	5.051
3. Enterprises targets	ESSI $_3$	5.043
4. Financial resources	ESSI $_4$	5.119
5. Specific expertise	ESSI $_5$	5.117
6. Infrastructure developmental	ESSI $_6$	4.874
7. Monitoring the performance and efficiency	ESSI $_7$	5.103
Motivation by External Variables	**ESS E**	4.558
8. The laws and bylaws in every country	ESSE $_8$	4.214
9. Socio-economic stressors	ESSE $_9$	4.315
10. external needs and global trend	ESSE $_{10}$	5.145
B. Standby		
Management	**St ESS**	4.312
11. Eagerness of top management to drives towards sustainability production	S1	4.312
Supporting Resource	**SSR**	4.52
12. Supporting strategies set	SSR $_1$	4.789
13. Financial resources	SSR $_2$	4.513
14. Specific expertise	SSR $_3$	4.546
15. Infrastructure developmental	SSR $_4$	4.802
16. Company culture to direct toward visual sustainability production	SSR $_5$	4.556
17. The degree of sustainability production help the business production, comparing strategies to other production	SSR $_6$	3.914
Current Practices		4.03
18. Resources production allocation	CP_1	4.103
19. The comparing to other companies out of the country	CP_2	4.085
20. The level of eco-safety-system sustainability in the business	CP_3	3.901

IV. T-TEST

The hypotheses were tested using parametric methods (A one-tailed t-test; provides the critical values). The statistical arithmetical operations results are summarized in Table-5, while the observations are independent. The significance type-I error level is α =0.025. Since the average above 3.6 has a positive motivational effect (i.e., ESS implementation), the hypothesis is $\mathbf{H_1}$: $\mu > 3.6$.

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Table-5. The t-test outputs in sum and substances

The targets	Significant value	t *df*=67	Sig.	T. Value = 3.6 average	Std. D.
1. Eco-Safety-system from Mng.	3.30	9.01	< 0.001	4.404	0.86
2. ESS based on IS variables	3.38	25.89	< 0.001	5.051	0.51
3. ESS based on ES variables	3.34	13.12	< 0.001	4.558	0.68
4. Eagerness of management	3.23	5.96	< 0.001	4.312	1.14
5. Standby in terms of internal supportive measures	3.36	15.17	< 0.001	4.520	0.61
6. level of eco-safety-system	3.27	3.55	0.01	4.03	0.96

The basic backcasting attributes correlation analysis shows at (Table-3), where a significant and robust relationship between 'Safety procedures' and 'Management Eagerness' (0.748**) results from 'Management Eagerness Culture.' At the same time, there are significant relationships between 'Internal Variables,' 'External Variables,' and 'Eagerness' about 'Supporting Internal Actions,' which correlate significantly with the 'Degree of eco-safety-system of Sustainability in the Company.' The optimal tuning to monitored parts that affect eco safety indicators is illustrated in Figure-7, and these values are controlled by 'PLC' system.

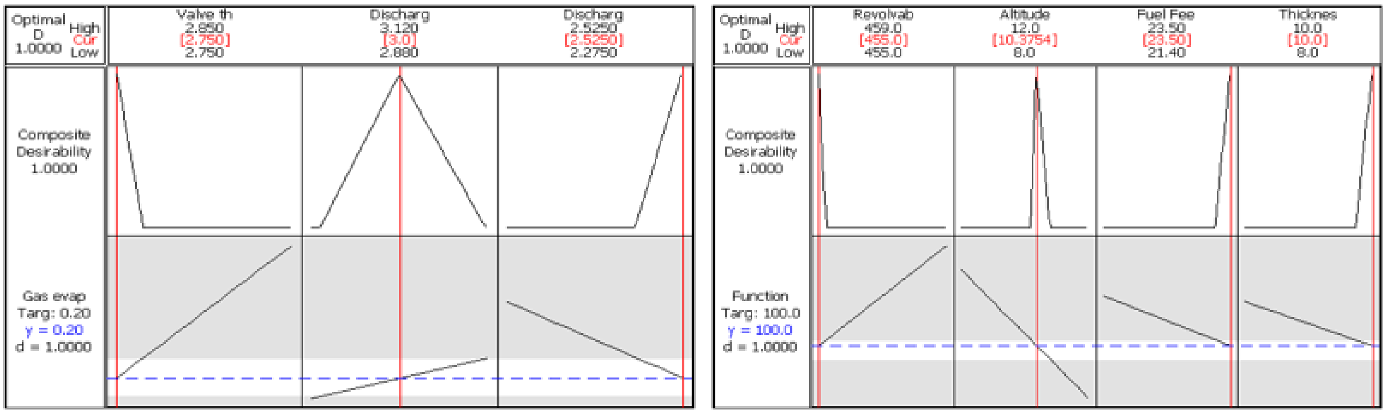

Figure-7: The optimization values to control the operations to prevent the dioxide carbon emissions

V. DISCUSS

The findings reveal that generating electricity companies production enterprises recognize the beneficial safety influence of the elements on management's production sustainability, both internally and externally, while rating management preparedness as only moderate (Table-4 and Table-5). This supports the (**H_1**): there is a *+ve* relationship between motivational elements (management motivation) and management eagerness. Generating electricity companies are aware of the evolution of sustainability and, in general, find internal considerations to be quite inspiring. The findings also support the previously stated assumptions (**H_2**): a *+ve* association between motivating variables and enterprises' sustainability preparedness generating electricity companies. The analysis reveals that internal variables reinforce supportive internal actions. The significant association between internal and external motivating variables and 'internal supporting measures' demonstrates the motivating elements' driving influence on 'internal supporting measures' (Table-3).

A. Implementation and efficiency

The majority of responding companies believe that sustainability strategies have a slightly more positive impact on business growth than other business strategies (CP1, = 4.103). Meanwhile, sustainability production methods receive more resources and attention (CP2: = 4.085 and CP3: = 3.901). However, the mean score (Table-4) for the level of eco-safety-system sustainability in the business does not contain significant evidence of the remarkable performance of sustainable production. The sparse information indicates that sustainable production in these generating electricity companies is still in its infancy. The companies interested in adopting sustainability vision achievements and forcing their policies to research and production contributed to finding new material named eco-sustainable, the community advocates to transaction. Figure-8 shows the backward prediction to set vision value of emissions, which sketch a smoth referenced curve to evaluate the policies and justify it to achieve the objective. Also, Figure-9 shows the deviation which affect the sound deployment, while Figure-10 illustrates the partially success during the period from Jan-2020 to Dec-2021, where the process cabapilities to 1.19 but need more effective standrization actions to achieve the target before 2030.

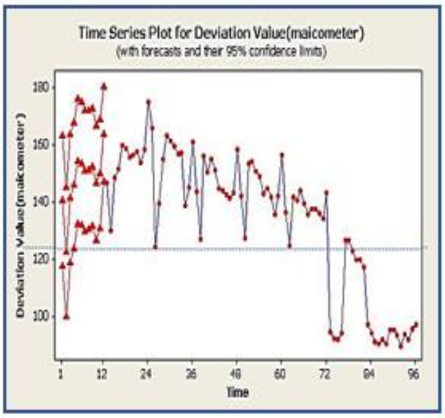

Figure-8: The predictive flactuated points using grey IAGO method

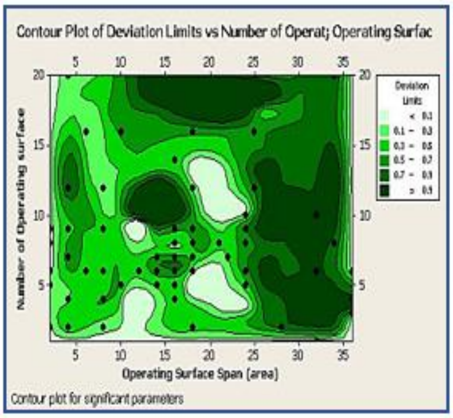

Figure-9: The sound deployment at specific area for specific point appeared at fig. 8

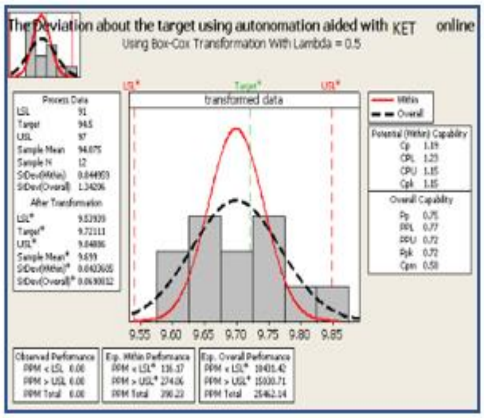

Figure-10: The capability of specific point appeared at figure-8

VI. CONCLUSIONS

Backcasting integrated with the grey method is openly normative, entailing "going a rear" from a specific end-point n (setting by experts) to the present to identify what suitable policy actions would be necessary to get there [43]. The Middle Eastern sustainability vision 2030 is deduced from Grey predictive Model GM (Li,2) [36]. This work platform makes it easier to mainstream green infrastructure measurements that support the climate summit's recommendations on the polluting sectors' eco-safety and guarantee that such adopted methods give more sustainability and business value through visual follow-up [39]. The analysis of acquisition data revealed that 65.8% of projects have viability. The GESC index for the selected company was 52.28% in Dec-2021, which upgrades them to continue tackling all obstacles to achieve good progress. It should also encourage academics to mainstream the visual supervisory control and data acquisition via KET that succeeded via online monitoring in reducing the carbonic emissions by 37% and the depletion of natural resources by 14%.

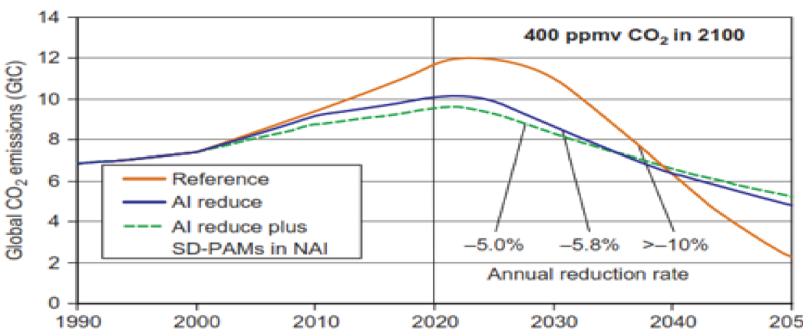

Figure 11: Alternative global CO2 emission pathways leading to a CO2 concentration of 400 ppmv in 2100 for a reference case. [42]

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