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Dynamic Model Based on the Gaming Argumentation Framework (DGAF): Foreign Exchange Market as A Case of Study

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Abstract— *argumentation has become an attraction recently, because it is widely used in decision-making, at 1994 Dung invented a new argumentation model, called Argumentation Framework AF. This system investigates assaults of arguments, and it also works away on attributes, this model is designed to take care of argument attacks among them, without paying attention to how the sentences are formulated or arranged, and identify the supporting and supporting arguments. It is also possible for a group of experts, to evaluate arguments to resolve the debate about the current problem, by determining the extent to which a particular argument affects the other by attacking it, This framework was a comprehensive new system, called the gaming argumentation framework (GAF), It helps make decisions about the current problems, through making Claims and Attack Determinations (CAD) to arguments, and after that, putting the result of those CAD to game theory, with 2 players for the purpose of achieving final results, which are helpful for decision-makers, in making decisions concerning current problems. The present paper gives a proposed system, using the GAF to build the dynamic model based on the gaming argumentation framework (DGAF); it as works as the GAF by adding the feedback to suit all possible conditions, and by making a companion between them, the argumentation and the game theory. Since the foreign exchange market depends on changing conditions, it was a case study.*

Index Terms— *argumentation, physical weight, initial list, dynamic list, final list, game theory, Nash equilibrium.*

I. INTRODUCTION

There is an excellent link between artificial intelligence (AI) and the decision-making process, as decision-making depends on perception and thinking, so artificial intelligence was relied on in the decision-making process. This work focuses on discussing the decision-making about the current state, taking into account the conditions affecting that case, by using argumentation in the AI [1][2]. The Expert system and reasoning have many relationships with AI [3]. The over-simplification of choice, and game theory has empowered space-free advancement in AI research [4]. For example, the argumentation plays a big role in the decision-making field[5], the Dung's argumentation framework (AF) gives a mathematical model for comparing arguments and has several uses, including decision-making[6], the GAF extended the AF; by making the combination between the AF and the game theory to improve the output, to make the decision about a current state with one condition[7][8], the DGAF uses the GAF to build a new model by adding different types of conditions about the current state to improve the output and gives more flexibility to the GAF. The currency market is one example of the influence on the surrounding factors, where it is affected by ups and downs, among the essential influencing. There are many factors, some of which will be mentioned later in this research [9] therefore

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this paper takes a foreign exchange market as a case of study; a system has been taken and modified, to accommodate all possible cases according to the different surrounding conditions, Using game theory according to Nash equilibrium, The process was repeated several times to get the best results (multi Nash equilibrium), Down to the final result by calculating the sum of the difference between the results, so that the final decision is taken after, to get the result, which in turn gives the decision about the current situation. The main objective of this research, is to present a highly dynamic system that has a remarkable ability, to help make decisions by taking seriously the external factors that impact, as they directly affect the final result, so this system can be relied upon, to a large extent in the decision-making process, The proposed system relies on weighted arguments, and because it differs from other weighted systems, by making the weights system an integral part of the general system, making the weights system in a general system provides a more accurate result. The method of the physical weight focuses on the physical size, of the argument and the extent of its attraction to the goal. The stronger argument is heavier and therefore closer, to the achievement of the objective as well as supporting main arguments, as this system relied on expert evaluation, in determining the weight of the argument. Match theory also represents an essential part of the system, as it was relied upon to resolve the controversy and find its outcome. In other words, the match's outcome determines the main winning argument, and thus this system can play an essential role in the decision-making process.

This model work by giving weight to each argument, using the physical weight method, in the first time all arguments are acceptable, except the arguments with zero weights, the system makes Cartesian multiplication between all acceptable arguments, to generate the attacks as the ordered pairs, calculate the power of attack between the ordered pairs, calculate the result of attack to each attack, finally making game between attacks, by using the Nash equilibrium method, to give the final result.

II. LITERATURE REVIEW

The gaming argumentation framework (GAF) consolidates a game theory, and the argumentation framework AF to give another framework. It assists with making a choice about this issue, by making CAD to the arguments, then putting the aftereffect of these CAD, to the game theory with two players, to accomplish the eventual outcomes that help the chief to make a choice about the current problem [13]. The Preferences based argumentation frameworks (PAFs), center around worthiness by making interaction, and giving circumstances to decide the preferences arguments. It gives numerous commitments, to guarantee the utilization of these preferences is permitted. Characterizing safeguard and joint guard that happens between the different arguments; distinguish two basic thoughts of ampleness (solitary pleasantness and joint value), and to present a bound together wide framework where the two considerations are used, consider tendency relations between arguments to pick the most acceptable of them [14]. The value-based argumentation frameworks (VAFs), give a levelheaded premise to tolerating or dismissing arguments, by looking at the attacked and upheld arguments and picking between them. The essential arrangement is to the value-based argumentation frameworks. It is based on giving an intelligent climate, in which to think about the arguments that assume the part of the attack, and those that shield by making a fundamental conversation framework wherein to invest values, of the arguments and energy to foster values for those arguments [2]. The lengthy argumentation framework (EAF), not exclusively to attack different arguments, yet in addition on different attacks and same time permit the contention, to create a further developed struggle connection, it favored arguments are not acquired through outside orders but rather are gotten instinctively through arguments that aggravate each other, like when contention (A) attack on contention (B). By then, one would reason contention (A) routs contention (B) if the contention (S) that one is correct now devoted, to contains no contention ensuring that B resembles to A [15]. bipolar argumentation framework (BAF), provides for set of relationship rout connection and backing connection, it relies upon the correspondence between

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arguments tended to by the supporting association. This new association is believed to be liberated from the misfortune association (like it isn't portrayed using the misfortune association). Hence, this framework has a bipolar depiction of the relationship between arguments. A bipolar argumentation construction can regardless be tended to by an organized graph, with two kinds of edges, one for the lost association and one more for the help association [10]. Unique persuasive frameworks (ADFs), adding to every contention a particular acknowledgment condition, the principle thought is to lay out a particular acknowledgment condition, for arguments that take into consideration conceptual arguments as well concerning adaptable and dynamic connections. All the more formally, a convincing hypothetical construction is an organized outline whose center points address arguments, explanations, or positions which can be recognized or not. The guideline thought to the ADF is adding to each contention a specific affirmation condition [1]. Control argumentation frameworks (CAFs), give a dynamic model, it can change after some time, mirroring the dynamics of the climate, it sums up the methodologies, specifically the run of the mill increase prerequisite, by obliging the opportunity of weakness in exceptional circumstances. Section (A) in the CAF can oversee conditions where the particular course of action of arguments is dark and ward upon improvement, and the presence (or direction) of specific attacks is furthermore dark. It could be sent by experts to ensure that various arguments have significance for 1 or all of the increases, anything the attacks' and arguments' certifiable plans, CAF joined 3 segments, the initial portion is referred to as the part (F) represents CAF's fixed piece [1]. The weighted argument framework (WAF), which is responsible for extending Dung's model with the addition of a new element that is referred to as the weight, has high importance for the determination of winner from multiple arguments which attacked one another, in the system, an argument is associated with weight value, which denotes the size and represents an indication of the relative strength of an attack on such system, upon the basis of budget inconsistency notion. The properties of inconsistency include its adaptation for being hindered with inconsistent budget (β) in which the attacks with total inconsistency weight (β) will be disregarded. This method is distinguished over unweighted systems, as it gives arrangements that can be used in deciding the seriousness, when unweighted argument models do not have any [2]. DAF (i.e., deontic argumentation frameworks) focus directly on the basic concepts of obligatory thinking, i.e., permissions and prohibitions, and obligations. Legal and preaching thinking is revealed from different angles and concepts, the most important of which are basic obligations and permits of freedoms and rights. The main idea of this model focuses on the above concepts as the validity of the obligation prevent other commitment[3].

The aim of this research paper, is to present a dynamic argumentation model that can be used in the decision-making process, and extrapolation of future decisions as well, by evaluating the GAF model.

III. BACKGROUND

Here the focus is on the most important pillars, on which the proposed model was built, where dynamic models were used, as well like the argumentation framework, dynamic model, the GAF model, and the foreign exchange rate.

A. Argumentation frameworks AF

AF no particular attention is given to the internal structure, of arguments but rather to attacks that will be arranged as ordered pairs.[4][5].

Definition 1. The **AF** represents a pair of tuples **AF = (arg, att)** where: -

The 1st one is (arg): representing a group of the arguments.

The 2nd one is (att): representing a binary relation on **arg**.

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B. Gaming Argumentation Framework (GAF)

The GAF was extended Dung's argumentation framework AF by using Game Theory GT. It has three main components CAD, Game theory to claims, as well as arguments, and decision. The main goal of this framework, is to help in the decision-making by giving one solution, but its main limitation is that it does not consider the external impact conditions [6]. This research paper presented another model, which depends on the development of the current model through external impacts.

Definition 2: GAF can be considered as a three-element (A, P, G) where:
- A: represents the group of the arguments.
- G: refers to the gaming process between the supporting arguments for every one of the MAs.
- P: denotes CAD on A, the output of this CAD ⊆ AxA.

C. dynamic model

The dynamic system is the input variable, giving different results for any new event. The dynamic system is susceptible to external impact, so it is very effective with daily activities, such as the currency market system. The currency market is a dynamic system, because it is affected by surrounding conditions such as supply and demand. It is not fixed with time and with external influences[7].

D. Foreign Exchange rate

Eight essential elements control the currency's exchange rate and affect it directly. The currency market is one of the fundamental ways, to measure the economy's health in relative terms. Moreover, the measure of the currency exchange rate in countries, is relied on as a window to determine the economic stability of countries, which calls for continuous monitoring and analysis, and the decision must be taken about currency trading after studying the market well[8].

a. Inflation Rates: Economic inflation directly affects the exchange rate of the currency. Naturally, a rise in economic inflation leads to a decrease in the currency's price and a higher interest rate.
b. Rates of Interest: The interest rate affects the currency's values directly, as interest rates are linked to the inflation rate; higher interest brings in more capital and thus higher exchange rates.
c. Country's Current Account / Balance of the Payment: The balance of payments in countries affects the exchange rate, shifting debts, exports, and imports.
d. Government Debt: The public debt of governments restricts them from obtaining foreign currency to support their economies and thus the depreciation of the local currency.
e. Terms of Trade: The rise in exports against imports, and vice versa, directly impacts the currency's price.
f. Political Stability & Performance: Political Stability is an essential factor in the exchange rate stability. Politically stable countries are more attracted to the currency than their politically unstable counterparts.
g. Recession: Economic stagnation is a significant reason for countries not obtaining foreign currency, and therefore the exchange rate will be directly affected.
h. Speculation: Speculation in the currency market is one factor that raises the demand for it and thus leads to its increase.

IV. DYNAMIC MODEL BASED ON THE GAMING ARGUMENTATION FRAMEWORK (DGAF)

The Dynamic model based on the gaming argumentation framework (DGAF), is extends the GAF [6], by adding two elements, the first element called dynamic claims under external impact, and the second element called the feedback. It makes CAD, and then inserts the result of these CAD, to the

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game theory (GT) with 2 players, for the purpose of achieving the ultimate resolute in this system. The determination of the winner, is performed between 2 main arguments Mas, through the division of the input set to 2 sets, and every one of those sets includes MA, with its related supporting arguments as a group of the arguments. Claims under the external impact work when the claims are changed under the external impact, because the dynamic models are continuing to change over time, that needs to be reconsidered this is because the weights of the arguments will change; because the assessment of Experts will change under the new variables under that impact, the feedback means to repeat the process under the new external impact see *Fig. 1.*

Definition 3: the (DGAF) is four components (D, A, P, G) where:

- D: refer to dynamic claims under external impact and change in the arguments weights.
- A: represents a collection of the arguments.
- P: represents CAD on A, the CAD $\subseteq$ A × A output.
- G: represents the gaming process between the supporting arguments for every one of the MAs.

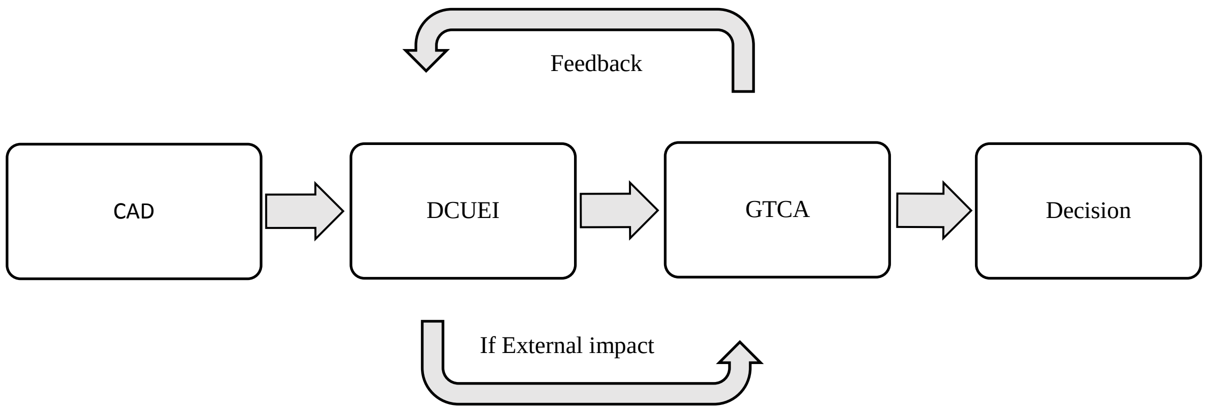

FIG. 1. DYNAMIC MODEL BASED ON THE GAMING ARGUMENTATION FRAMEWORK (DGAF).

A. Claims and Attack Determinations (CAD)

CAD includes ISA, CAA, PA, and RA[6] see *Fig. 2.*

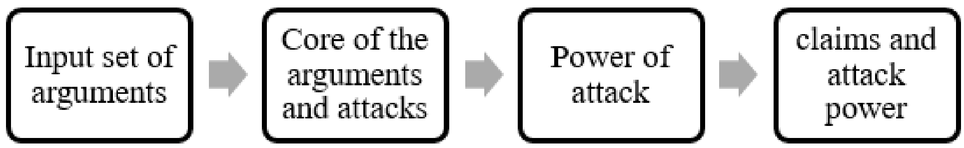

FIG. 2. CAD WORK-FLOW.

a. Input Set of Arguments (ISA)

Each main arguments MA represents one of the players with its support group see *Fig. 3,* which the system will determine his victory or loss, the main winning argument is calculated with the use of game theory with 2 players, and the final result of resolving this argument represents the victory of one of these two arguments, and thus this system helps in the process of decision making the system ISA has two tuples: -

- The First MA, as well as its supported set, is referred to as the IL.
- The second MA, as well as its supported set, is referred to as the IL_2.

Definition2 (main argument (MA)): where tuple A represents the argument input set, sets X and $\neg X \in A$ and sets $X \cap \neg X = \phi$ where: -

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- A represents arguments' input set.
- X ⊆ A, X represents MA, and this set's elements support MA X.
- ¬X ⊆ A, ¬X represents MA elements of that set support MA ¬X.

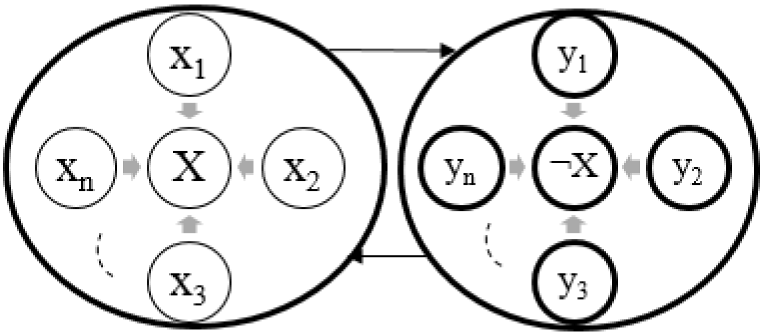

FIG. 3. ATTACKS BETWEEN MAS.

b. Core of Arguments and Attacks (CAA)

The CAA represents 2nd part of CAD. It denotes GAF core, due to the fact that it provides the arguments' weights, its central component in the proposal system, the weighted system depends on the weight of arguments; therefore, the CAA plays a significant role in this framework because the weight directly affects the final outcome of the argument, as well as in resolving the argument in favor of the main winning argument. The CAA has five components (IL, HE, DL, PR, and FL)[6] see *Fig. 4.*

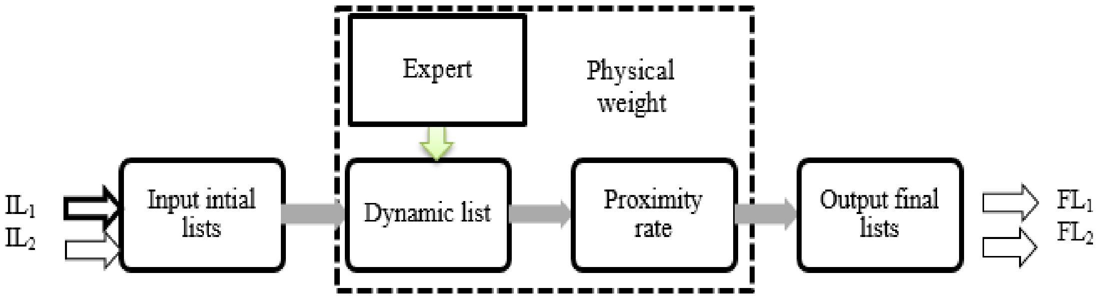

FIG. 4. DGAF CORE WORK-FLOW.

i. Input initial list (IL)

The proposed system consists of 2 ILs; every one of them represents the argument supporting the main argument. The IL includes a set of arguments; they were arranged randomly, as the experts have a critical opinion in re-arranging them from the strongest to the weakest, representing the FL. Arranging the arguments represents the first stage in the process of weighing them later [6]: -

1- The set of arguments supports the first MA called IL_1.
2- The set of arguments supports the second MA called IL_2.

Definition 4: (IL) elements in X and in ¬X which have been stated in definition2 had been referred to as the IL where: -

- Elements in X are referred to as IL_1
- Elements in ¬X are referred to as IL_2
- IL_1 length could be equal to IL_2 length or otherwise.

ii. Physical Weight (PHW)

Since weighted systems are directly affected by the method of weight, two different methods can give different weights, which affects the final result in resolving the argument[9]. Therefore, the GAF

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has introduced the weighting method to represent an essential element of its components, and in this case, the system has benefited. Many arguments are weighted in a more realistic way, which gives a more realistic result. There are many ways to calculate the arguments weights: -

Weighted Majority Relations: In the multi-agent settings, 1 natural interpretation is that the weight denotes the number of votes that support an attack. [15] [21].

Weights as Ranking: weights to rank relative strength of the attacks between the arguments [21].

PHW: to accomplish the arguments, loads, relying upon three-section by blending between two above ways and adding another part considered DL this way called a PHW. The PHW has three sections displayed in *Fig. 4*, powerful rundown, HE, and PR. The PHW framework has been Inspired by the gravitation framework, where contention that the most elevated weight value is the nearest to accomplishing an objective relies upon the expert's perspective [6].

iii. Dynamic list (DL)

DL has been represented by 2-D array see Table I. The quantity of lines relies upon IL_1 and IL_2 lengths, and quantities of segments rely upon the quantity of HEs. It utilizations to improve contentions as per their closeness to accomplishing the objective and as indicated by their capacity to accomplish it, where the more grounded contention is higher, etc. In the wake of contrasting L_1 and L_2 lengths. DL length has approached double the length of the most comprehensive rundown[6].

Definition 5: (DL) can be defined as 2D matrix, the number of the rows is dependent upon $IL_{1,}$ and IL_2 lengths and columns' number is dependent upon the number of the HEs, the number of the scores to every one of the arguments is dependent upon its location as an Expert opinion where: -

- DL length = max (IL-1, IL-2)x2.
- DL width = number of the HEs.
- Where there is an argument that is referred to as (x_i), then number of the scores to that argument becomes= $\sum_{i=1}^{n} \quad scores(x_i)$ Depend upon the location. The way for the generation of DL?
- Input IL_1 & IL_2.
- DL length = max (IL_1, IL_2) x2.
- Determination of HE number.
- DL width = No. of the HEs.
- No. of the scores = DL length.
- Experts re-arrange IL of the arguments and specify argument's location as the opinion.
- The distribution of the scores is performed from the top down.
- The result is Argument x_i, No. of scores of x_i = $\sum_{i=1}^{n} \quad scores(x_i)$ is dependent upon its location.

TABLE I. DL (8,10) IN THE CASE WHERE 10 HES & MAX (IL 1=4, IL 2=3)X2 =8

No.	Score	HE_1	HE_2	HE_3	HE_4	HE_5	HE_6	HE_7	HE_8	HE_9	HE_{10}
1	8										
2	7										
3	6										
4	5										
5	4										
6	3										
7	2										
8	1										

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iv. Human Expert (HE)

The HEs They have the superior ability to analyze problems, in their field of work because they possess the knowledge, that enables them to infer the correct ways in their field of knowledge, in any case, they can infer through practice, so they were used to build an effective system[10]. In this work, HEs play a significant role in generating the weight of the arguments [6].

v. Proximity Rate (PR)

The PR calculates using probability (1)[1] to make the arguments weight between zero and one.

$$PR = \left(\sum_{i=1}^{n} scores(x_i)\right) / (1^{st} \text{ score x No.of the Experts}) \quad \dots (1)$$

vi. Output Final List (FL)

Whenever IL has been placed into CAA, it was organized haphazardly. Although, all things considered, after the arguments were given loads, they ought to be modified by the higher loads in sliding request by utilizing the last rundown; this rundown isn't equivalent to the IL since it wiped out the zero-weight argument from it in the wake of making CAD [1]. In this way, every IL has an FL after being adjusted. After presenting the arguments in IL to a group of experts, they are arranged differently and in another way, from the strongest to the least influential, calculating their weight more available than before, urging that FL represents the final arrangement of the arguments according to their influence and the strength of their support for the main argument.

Definition 6: FL $\subseteq$ IL where: -
FL could be equal to IL length or otherwise.

vii. Power of Attack (PA)

The PA is determined using the equation below, and it represents an essential part of the system, as the result of the attack is used in game theory, and therefore has the largest role in determining the main winning argument; it is basic to work out the strength of the assault; when strong contentions have traded the assault between one another, the force of the assault is determined by the condition (2)[6], [11] where the r_i is argument in the FL_1 and the r_j is argument in the FL_2.

$$PHW(r_i, r_j) = \frac{PHW(r_i)}{1+PHW(r_j)} \dots (2)$$

viii. Claims and Power of Attack (CPA)

For the purpose of calculating RA, PA equation is extended through the addition of TP or tie case parameter then making a difference between PA and TP, TP may as well be utilized as a threshold through cases below, in the case where there are 2 arguments r_1&r_2, where k represents RA, then[6]: -

- Case1: if $r_1 = r_2$ results from attack = 0.
- Case2: if $r_1 > r_2$ result of attack = +k.
- Case3: if $r_1 < r_2$ result of the attack = -k.

Results of attachment can be computed from Eq. (3): -

$$PHW(r_i, r_j) = \frac{PHW(r_i)}{1+PHW(r_j)} - \frac{PHW(r_i)}{1+PHW(r_i)} \dots (3)$$

tie point (TP): Whenever all of the attacks have similar weight, they match with Dung's ones in relating level diagram [17], Where argument assault on another argument has similar value of the weight which implies strength of the assault and safeguard is something very similar for this situation called TP[12]. By utilizing the accompanying condition can compute the RA relying upon two boundaries, the main boundary is the strength of assault see condition (2), and the subsequent boundary is TP where (t) represented the TP see equation 4 [1]: -

$$PHW(r_1, r_1) = \frac{PHW(r_1)}{1+PHW(r_1)} = t \dots (4)$$

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Definition 7: the TP represented where the arguments r_1 & r_2 have similar weights (PHW). Which is why, the attacks' strength between one another is similar [6]: -
Assuming that r_1&r_2 represent 2 arguments and, PHW (r_1) = PHW (r_2) in such case: -
Attacks (r_1, r_2) strength = attack (r_2, r_1) strength.
In the case where a pair of the arguments r_1 & r_2 prior, to the insertion of those arguments should make a try through the calculation of the power of the attack, in the case where r_1 attacks themselves, let PA, in such case, is t which is TP, as can be seen from the example below: -
In the case where the argument r_1 attacks r_2 there are 2 steps: -

a. Determining tie point through the calculation of the attack power in the case where r_1 attack themselves with the use of PA based on: -
b. $PHW(r_1, r_1) = \frac{PHW(r_1)}{1+PHW(r_1)}$ = t … (4)
c. Calculate the RA by making a difference between the PA and TP such as where t = tie point can be rewrite the equation (3) to be equation (5) as following: -

$$PHW(r_1, r_2) = \frac{PHW(r_1)}{1+PHW(r_2)} - t \ldots (5)$$

B. Dynamic Claims Under External Impact (DCUEI)

In normal life, the argument is subject to the surrounding conditions; this means that Experts will give a different opinion under different conditions, the Experts give, Experts will assign different values to the arguments, thus affecting the final results, the DCUEI work with the constant changes in the surrounding conditions, also it changes with time, where the surrounding conditions change with time. in the dynamic model, the Arguments stable over time, and the weight of the arguments changes over time, depending on the conditions that are surrounding the current state. With each condition, the results are different for the same data, as the condition is a very influential factor on the final result, the DCUEI part It represents the addition to the GAF system, which enabled it to work according to different conditions, this system is the closest to reality As the circumstances surrounding a particular event directly affect the outcome, So it was taken into consideration.

C. Feedback

Where the GTCA represents the final stage before the output stage, the feedback means recalculating again under the conditions of the new impact. Return to square one in the system to recalculate again and thus obtain a new result; this means the system continues to work with the time and with the new conditions; the feedback represents the turning point in this system, through which it is determined whether the system needs to work in a new cycle under a new influence or not, so it is considered an essential element in this system, as it represents an essential addition to the developed system, and distinguishes it from the previous system.

D. If External Impact

In this part, in the event of an external impact, the system will return via feedback. The system recalculates the results again under the impact of that influencer, as the results will change perhaps radically. This part is significant because it is sensitive to external influences, which will inevitably change the results. This makes this system the closest to reality.

E. GT to the claims and arguments (GTCA)

GT can be represented a logical field for reviewing and examining a person's essential, regular choice cycles and communications in a (social) climate. [18].

CDA: Game theory is a mathematical model that focuses on solving a specific problem and gives a final result between two players. Loss and profit are essential, and there must be a winner, so it is used in the decision-making process [6] [13]. Game theory was used in this system because need to resolve the controversy; need a winning argument, which represents the result of the argument. There are

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several types of games that depend on the number of players. This system depends on the game of two players

F. Decision

The DGAF gives a set of solutions, and it gives a new solution with each cycle. Each new impact entering the system means a new cycle. The game's result is the eventual outcome of the argument, which is utilized to settle on a choice. More methods come by the game outcome in the game hypothesis, for example, Nash equilibrium [1].

a. Nash equilibrium

Prevailing systems express ideal circumstances arrangements for individual players. A similar technique is ideal for the two players. In shared use of prevailing procedures, can see an equilibrium in which no player can benefit by one-sidedly changing a system (i.e., Nash equilibrium)[12]. J. F. Nash demonstrated that each limited game has around 1 such arrangement, and these called a states harmonies [18].

b. Delete Nash state and re-game (multi Nash equilibrium)

in this stage, delete the row and column which found in the Nash equilibrium, and re-game until getting all the results, making this procedure to obtain all the results and to ensure fairness between the contestants, also to getting all attacks are acceptable[14], this stage work as following: -

i. Getting the first result using a Nash equilibrium.
ii. Delete the row and column containing the first result.
iii. Re-game the match with fewer rows and columns than at the start of the match.
iv. Getting the second result using a Nash equilibrium.
v. Delete the row and column containing the second result.
vi. Repeat the process for all remaining rows and columns in the same way.
vii. Consider the results as acceptable attacks.
viii. Comparing the acceptable attacks, finding the difference between them, and calculating the final points.

V. CASE OF STUDY

Business in general and the currency market, in particular, represents a dynamic model because it is affected by external factors, it is very sensitively affected by external factors, like working under normal conditions such as supply and demand and unusual factors such as natural disasters, wars, and pandemics, so it was taken as a case study to apply a dynamic model to the proposed model DGAF, where different results will be obtained under different conditions.

Example

Here asks a question: Will the local currency increase against the dollar or decline? Different conditions were chosen to work under them: -

Part one: conditions without crisis

- Supply.
- Demand.
- Economic depression.

Part two: conditions within crisis

- War.
- Natural disaster.
- Pandemic.

a- Factors that lead to an increase in the local currency value against the dollar: -

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i. Low Inflation Rates.
ii. High – Rates of Interest.
iii. High Country's Current Account and Balance of Payments.
iv. High Government Debt.
v. Exports are more significant than imports.
vi. Political Stability and good Performance.
vii. Low Recession.
viii. High Speculation.

A sample form is used to present it to the Experts to evaluate the arguments under external impacts that are mentioned above, then built a table containing the factors that lead to an increase in the local currency value against the dollar

b- Factors that result in decreasing in the local currency value against the dollar

i. High Inflation Rates.
ii. Low- Rates of Interest.
iii. Low Country's Current Account and Balance of Payment.
iv. High Government Debt.
v. Imports significant than exports.
vi. Political no Stability and lousy Performance.
vii. High Recession.
viii. Low Speculation.

Part one: conditions without crisis, work with supply condition.

A sample form is used to present it to the Experts to evaluate the arguments under external impacts mentioned above, then built a table containing the factors that result in decreasing the local currency value against the dollar. Work under the (supply) condition without crisis: -

Solutions

***A. Generating MAs**: -*

Assuming that A represents a set of the arguments = {X, x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, ¬X, y_1, y_2, y_3, y_4, y_5, y_6, y_7, y_8}.

Here have two MAs

Increase in the local currency value against the dollar = X

Decrease in the local currency value against the dollar = ¬X

B. Generating ILs: -

Argument X is supported with tuple referred to as IL_1= {x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8}, as following:-

a. Low Inflation Rates = x_1
b. High-Interest Rates = x_2
c. High Country's Current Account and Balance of Payments = x_3
d. Low Government Debt = x_4
e. Exports great than imports = x_5
f. Political Stability and good Performance = x_6
g. Low Recession = x_7
h. High Speculation = x_8

Argument ¬X is supported with a tuple that is referred to as IL_2= {y_1, y_2, y_3, y_4, y_5, y_6, y_7, y_8}, as follows: -

a. High Inflation Rates = y_1
b. Low-Interest Rates = y_2
c. Low Country's Current Account and Balance of Payments = y_3

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d. High Government Debt = y_4
e. Imports great than exports = y_5
f. Political no Stability and bad Performance = y_6
g. High Recession = y_7
h. Low Speculation = y_8

C. *Generating DL and PHW*

Where there are 10 Experts and IL $_1$ consists of 8 elements, and IL_2 consists of 8 elements see Table II Then: -
DL length = max (8, 8)x2 = 16 and.
DL width = No. of the Experts = 10.
1st score = 16 and final score = 1.
The arguments have been provided to 10 Experts who are now responsible for the generation of PHW and DL_1 to IL_1 $\{x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8\}$.
Generate the DL_1 depending on expert's opinions: -

TABLE II. DL1 WITHOUT CRISIS UNDER THE SUPPLY CONDITION

No.	scores	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10
1	16										
2	15	x_2		x_8	x_8	x_2		x_6			
3	14		x_6	x_2	x_6	x_6	x_8	x_2	x_8	x_6	x_6
4	13	x_8	x_4	x_6	x_4	x_8	x_2	x_8	x_6	x_8	x_2
5	12	x_6	x_3		x_2		x_6			x_2	x_5
6	11				x_5			x_5	x_2	x_5	x_8
7	10	x_4	x_2	x_5	x_7	x_5			x_5		x_7
8	9	x_1	x_5			x_7	x_5	x_4	x_4	x_7	
9	8						x_4	x_7	x_1	x_4	
10	7	x_5	x_7	x_7		x_4	x_1	x_3		x_3	x_4
11	6			x_4		x_3	x_3	x_1	x_3	x_1	x_3
12	5	x_7	x_1			x_1	x_7		x_7		
13	4			x_1	x_3						x_1
14	3			x_3	x_1						
15	2										
16	1	x_3	x_8								

Generate the PHW to the IL1 depending on the DL_1 see Table III: -
The PHW $x_i = \sum_{i=0}^{n} \quad scores(x_i)$ depend on location … (6)
For the purpose of making weight between 0 and 1:
PR = (First score * number of experts) / $\sum_{i=1}^{n} \quad scores(x_i)$ … (7)
1st score = 8
No. of the Experts = 10
x_1 = 57/ (10*16) = 0.35625
x_2= 129/ (10*16) = 0.80625
x_3= 48/ (10*16) = 0.3
x_4= 90/ (10*16) =0.5625
x_5 = 100/ (10*16) = 0.625
x_6= 135/ (10*16) = 0.84375
x_7= 75/ (10*16) =0.46875
x_8= 122/ (10*16) = 0.7625

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TABLE III. PHW

arguments	scores	weight	PR
x_1	(9+5+4+3+5+7+6+8+6+4)	57	0.35625
x_2	(15+10+14+12+15+13+14+11+12+13)	129	0.80625
x_3	(1+12+3+4+6+6+7+6+7+6)	58	0.3
x_4	(10+13+6+13+7+8+9+9+8+7)	90	0.5625
x_5	7+9+10+11+10+9+11+10+11+12	100	0.625
x_6	12+14+13+14+14+12+15+13+14+14	135	0.84375
x_7	5+7+7+10+9+5+8+5+9+10	75	0.46875
x_8	13+1+15+15+13+14+13+14+13+11	122	0.7625

The arguments have been presented to 10 Experts now, PHW and DL_2 see Table IV are generated to the IL_2 { y_1, y_2, y_3, y_4, y_5, y_6, y_7, y_8}.
Generate the DL_2 depending on the opinion of the expert: -

TABLE IV. DL 2

Number	Score	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10
1	16										
2	15	y_6									
3	14	y_1	y_6		y_7	y_6		y_6			
4	13		y_1	y_6	y_1	y_7	y_6	y_5	y_6		y_5
5	12	y_2	y_4	y_1	y_6	y_1	y_5	y_4	y_5	y_6	y_6
6	11		y_7		y_4	y_5	y_4		y_7	y_5	y_4
7	10	y_7		y_4			y_1	y_7			y_7
8	9		y_5	y_7	y_5				y_4	y_7	y_1
9	8	y_5	y_8	y_8		y_4	y_7		y_8	y_4	
10	7	y_8		y_2		y_8		y_1		y_1	y_8
11	6		y_3	y_5	y_3			y_8		y_8	y_3
12	5	y_4	y_2	y_3			y_2	y_3	y_1	y_3	y_2
13	4				y_2	y_3	y_3	y_2	y_3		
14	3	y_3			y_8	y_2	y_8		y_2	y_2	
15	2										
16	1										

Generate the PHW to the IL_2 depending on the DL_2 see Table V: -
PR = (First score * number of experts) / $\sum_{i=1}^{n} \quad scores(y_i)$ … (7)
Number of Expert's = 10
1st score = 8
y_1= 102 / (10x8) =0.6375
y_2= 51/ (10x8) = 0.31875
y_3= 48/ (10x8) = 0.3
y_4= 97 (10x8) = 0.60625
y_5= 104/ (10x8) = 0.65
y_6= 132/ (10x8) = 0.825
y_7= 105/ (10x8) = 0.65625
y_8= 63 (10x8) = 0.39375

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TABLE V. PHW

Argument	Score	Weights	PR
y_1	(14+13+12+13+12+10+7+5+7+9)	102	0.6375
y_2	(12+5+7+4+3+5+4+3+3+5)	51	0.31875
y_3	(3+6+5+6+4+4+5+4+5+6)	48	0.3
y_4	(5+12+10+11+8+11+12+9+8+11)	97	0.60625
y_5	(8+9+6+9+11+12+13+12+11+13)	104	0.65
y_6	(15+14+13+12+14+13+14+13+12+12)	132	0.825
y_7	(10+11+9+14+13+8+10+11+9+10)	105	0.65625
y_8	(7+8+8+3+7+3+6+8+6+7)	63	0.39375

D. *Generating FL: -*

Generation of FL_1 to IL_1 see Table VI depending on PHW through re-arranging IL_1 elements.

TABLE VI. FL_1

No.	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10
1	x_2	x_6	x_8	x_8	x_2	x_8	x_6	x_8	x_6	x_6
2	x_8	x_4	x_2	x_6	x_6	x_2	x_2	x_6	x_8	x_2
3	x_6	x_3	x_6	x_4	x_8	x_6	x_8	x_2	x_2	x_5
4	x_4	x_2	x_5	x_2	x_5	x_5	x_5	x_5	x_5	x_8
5	x_1	x_5	x_7	x_5	x_7	x_4	x_4	x_4	x_7	x_7
6	x_5	x_7	x_4	x_7	x_4	x_1	x_7	x_1	x_4	x_4
7	x_7	x_1	x_1	x_3	x_3	x_3	x_3	x_3	x_3	x_3
8	x_3	x_8	x_3	x_1	x_1	x_7	x_1	x_7	x_1	x_1

Generate the FL_2 to the IL_2 see Table VII depending on the PHW by re-arranging the IL_2 elements.

TABLE VII. FL2

No.	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10
1	y_6	y_6	y_6	y_7	y_6	y_6	y_6	y_6	y_6	y_5
2	y_1	y_1	y_1	y_1	y_7	y_5	y_5	y_5	y_5	y_6
3	y_2	y_4	y_4	y_6	y_1	y_4	y_4	y_7	y_7	y_4
4	y_7	y_7	y_7	y_4	y_5	y_1	y_7	y_4	y_4	y_7
5	y_5	y_5	y_8	y_5	y_4	y_7	y_1	y_8	y_1	y_1
6	y_8	y_8	y_2	y_3	y_8	y_2	y_8	y_1	y_8	y_8
7	y_4	y_3	y_5	y_2	y_3	y_3	y_3	y_3	y_3	y_3
8	y_3	y_2	y_3	y_8	y_2	y_8	y_2	y_2	y_2	y_2

E. *Calculate the PA: -*

Calculating the strength of the attack and defense with a use of the equation below see Table VIII and Table IX: -

$$PHW(r_i, r_j) = \frac{PHW(r_i)}{1+PHW(r_j)} \ldots (5)$$

when the $FL_1 = \{x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8\}$. And the $FL_2 = \{y_1, y_2, y_3, y_4, y_5, y_6, y_7, y_8\}$ make $FL_1 \times FL_2$ to calculate the power of an attack.

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TABLE VIII. THE PA (X, Y)

Attack	PA	Results
(x_1, y_1)	$(x_1, y_1) = x_1/ 1+ y_1$ = 0.35625/1+0.6375	0.217557
(x_1, y_2)	$(x_1, y_2) = x_1/ 1+ y_2$= 0.35625/1+0.31875	0.270142
(x_1, y_3)	$(x_1, y_3) = x_1/ 1+ y_3$= 0.35625/1+0.3	0.274038
(x_1,y_4)	$(x_1, y_4) = x_1/ 1+ y_4$= 0.35625/1+0.60625	0.22179
(x_1, y_5)	$(x_1, y_5) = x_1/ 1+ y_5$= 0.35625/1+0.65	0.215909
(x_1, y_6)	$(x_1, y_6) = x_1/ 1+ y_6$= 0.35625/1+0.825	0.195205
(x_1, y_7)	$(x_1, y_7) = x_1/ 1+ y_7$= 0.35625/1+0.65625	0.215094
(x_1, y_8)	$(x_1, y_8) = x_1/ 1+ y_8$= 0.35625/1+0.39375	0.255605
(x_2, y_1)	$(x_1, y_1) = x_1/ 1+ y_1$= 0.80625/1+0.6375	0.492366
(x_2, y_2)	$(x_2, y_2) = x_2/ 1+ y_2$= 0.80625/1+0.31875	0.611374
(x_2, y_3)	$(x_2, y_3) = x_2/ 1+ y_3$= 0.80625/1+0.3	0.620192
(x_2, y_4)	$(x_2, y_4) = x_2/ 1+ y_4$= 0.80625/1+0.60625	0.501946
(x_2, y_5)	$(x_2, y_5) = x_2/ 1+ y_5$= 0.80625/1+0.65	0.488636
(x_2, y_6)	$(x_2, y_6) = x_2/ 1+ y_6$= 0.80625/1+0.825	0.441781
(x_2, y_7)	$(x_2, y_7) = x_2/ 1+ y_7$= 0.80625/1+0.65625	0.486792
(x_2, y_8)	$(x_2, y_8) = x_2/ 1+ y_8$= 0.80625/1+0.39375	0.578475
(x_3, y_1)	$(x_3, y_1) = x_3/ 1+ y_1$ = 0.3/1+0.6375	0.217557
(x_3, y_2)	$(x_3, y_2) = x_3/ 1+ y_2$= 0.3/1+0.31875	0.270142
(x_3, y_3)	PHW $(x_3, y_3) = x_3/ 1+ y_3$= 0.3/1+0.3	0.274038
(x_3, y_4)	$(x_3, y_4) = x_3/ 1+ y_4$= 0.3/1+0.60625	0.22179
(x_3, y_5)	$(x_3, y_5) = x_3/ 1+ y_5$= 0.3/1+0.65	0.215909
(x_3, y_6)	$(x_3, y_6) = x_3/ 1+ y_6$= 0.3/1+0.825	0.195205
(x_3, y_7)	$(x_3, y_7) = x_3/ 1+ y_7$= 0.3/1+0.65625	0.215094
(x_3, y_8)	$(x_3, y_8) = x_3/ 1+ y_8$= 0.3/1+0.39375	0.255605
(x_4, y_1)	$(x_3, y_1) = x_4/ 1+ y_1$= 0.5625/1+0.6375	0.343511
(x_4, y_2)	$(x_4, y_2) = x_4/ 1+ y_2$= 0.5625/1+0.31875	0.42654
(x_4, y_3)	$(x_4, y_3) = x_4/ 1+ y_3$= 0.5625/1+0.3	0.432692
(x_4, y_4)	$(x_4, y_4) = x_4/ 1+ y_4$= 0.5625/1+0.60625	0.350195
(x_4, y_5)	$(x_4, y_5) = x_4/ 1+ y_5$= 0.5625/1+0.65	0.340909
(x_4, y_6)	$(x_4, y_6) = x_4/ 1+ y_6$=0.5625/1+0.825	0.308219
(x_4, y_7)	$(x_4, y_7) = x_4/ 1+ y_7$= 0.5625/1+0.65625	0.339623
(x_4, y_8)	$(x_4, y_8) = x_4/ 1+ y_8$= 0.5625/1+0.39375	0.403587
(x_5, y_1)	$(x_5, y_1) = x_5/ 1+ y_1$ =0.625/1+0.6375	0.381679
(x_5, y_2)	$(x_5, y_2) = x_5/ 1+ y_2$=0.625/1+0.31875	0.473934
(x_5, y_3)	$(x_5, y_3) = x_5/ 1+ y_3$= 0.625/1+0.3	0.480769
(x_5,y_4)	$(x_5, y_4) = x_5/ 1+ y_4$= 0.625/1+0.60625	0.389105
(x_5, y_5)	$(x_5, y_5) = x_5/ 1+ y_5$= 0.625/1+0.65	0.378788
(x_5, y_6)	$(x_5, y_6) = x_5/ 1+ y_6$= 0.625/1+0.825	0.342466
(x_5, y_7)	$(x_5, y_7) = x_5/ 1+ y_7$= 0.625/1+0.65625	0.377358
(x_5, y_8)	$(x_5, y_8) = x_5/ 1+ y_8$= 0.625/1+0.39375	0.44843
(x_6, y_1)	$(x_6, y_1) = x_6/ 1+ y_1$= 0.84375/1+0.6375	0.515267
(x_6, y_2)	$(x_6, y_2) = x_6/ 1+ y_2$= 0.84375/1+0.31875	0.63981
(x_6, y_3)	$(x_6, y_3) = x_6/ 1+ y_3$= 0.84375/1+0.3	0.649038
(x_6, y_4)	$(x_6, y_4) = x_6/ 1+ y_4$= 0.84375/1+0.60625	0.525292
(x_6, y_5)	$(x_6, y_5) = x_6/ 1+ y_5$= 0.84375/1+0.65	0.511364
(x_6, y_6)	$(x_6, y_6) = x_6/ 1+ y_6$= 0.84375/1+0.825	0.462329
(x_6, y_7)	$(x_6, y_7) = x_6/ 1+ y_7$= 0.84375/1+0.65625	0.509434
(x_6, y_8)	$(x_6, y_8) = x_6/ 1+ y_8$= 0.84375/1+0.39375	0.605381
(x_7, y_1)	$(x_7, y_1) = x_7/ 1+ y_1$ = 0.46875/1+0.6375	0.28626
(x_7, y_2)	$(x_7, y_2) = x_7/ 1+ y_2$= 0.46875/1+0.31875	0.35545
(x_7, y_3)	$(x_7, y_3) = x_7/ 1+ y_3$= 0.46875/1+0.3	0.360577
(x_7, y_4)	$(x_7, y_4) = x_7/ 1+ y_4$= 0.46875/1+0.60625	0.291829

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(x_7, y_5)	$(x_7, y_5) = x_7/ 1+ y_5= 0.46875/1+0.65$	0.284091
(x_7, y_6)	$(x_7, y_6) = x_7/ 1+ y_6= 0.46875/1+0.825$	0.256849
(x_7, y_7)	$(x_7, y_7) = x_7/ 1+ y_7= 0.46875/1+0.65625$	0.283019
(x_7, y_8)	$(x_7, y_8) = x_7/ 1+ y_8= 0.46875/1+0.39375$	0.336323
(x_8, y_1)	$(x_8, y_1) = x_8/ 1+ y_1= 0.7625/1+0.6375$	0.465649
(x_8, y_2)	$(x_8, y_2) = x_8/ 1+ y_2= 0.7625/1+0.31875$	0.578199
(x_8, y_3)	$(x_8, y_3) = x_8/ 1+ y_3= 0.7625/1+0.3$	0.586538
(x_8, y_4)	$(x_8, y_4) = x_8/ 1+ y_4= 0.7625/1+0.60625$	0.474708
(x_8, y_5)	$(x_8, y_5) = x_8/ 1+ y_5= 0.7625/1+0.65$	0.462121
(x_8, y_6)	$(x_8, y_6) = x_8/ 1+ y_6= 0.7625/1+0.825$	0.417808
(x_8, y_7)	$(x_8, y_7) = x_8/ 1+ y_7= 0.7625/1+0.65625$	0.460377
(x_8, y_8)	$(x_8, y_8) = x_8/ 1+ y_8= 0.7625/1+0.39375$	0.547085

TABLE IX. PA (Y, X)

Attack	PA	result
(y_1, x_1)	$(y_1, x_1) = y_1/ 1+ x_1 = 0.6375/1+0.35625$	0.470046
(y_1, x_2)	$(y_1, x_2) = y_1/ 1+ x_2= 0.6375/1+0.80625$	0.352941
(y_1, x_3)	$(y_1, x_3) = y_1/ 1+ x_3= 0.6375/1+0.3$	0.470046
(y_1,x_4)	$(y_1, x_4) = y_1/ 1+ x_4= 0.6375/1+0.5625$	0.408
(y_1, x_5)	$(y_1, x_5) = y_1/ 1+ x_5= 0.6375/1+0.625$	0.392308
(y_1, x_6)	$(y_1, x_6) = y_1/ 1+ x_6= 0.6375/1+0.84375$	0.345763
(y_1, x_7)	$(y_1, x_7) = y_1/ 1+ x_7= 0.6375/1+0.46875$	0.434043
(y_1, x_8)	$(y_1, x_8) = y_1/ 1+ x_8= 0.6375/1+0.7625$	0.361702
(y_2, x_1)	$(y_1, x_1) = y_1/ 1+ x_1= 0.31875/1+0.35625$	0.235023
(y_2, x_2)	$(y_2, x_2) = y_2/ 1+ x_2= 0.31875/1+0.80625$	0.176471
(y_2, x_3)	$(y_2, x_3) = y_2/ 1+ x_3= 0.31875/1+0.3$	0.235023
(y_2, x_4)	$(y_2, x_4) = y_2/ 1+ x_4= 0.31875/1+0.5625$	0.204
(y_2, x_5)	$(y_2, x_5) = y_2/ 1+ x_5= 0.31875/1+0.625$	0.196154
(y_2, x_6)	$(y_2, x_6) = y_2/ 1+ x_6= 0.31875/1+0.84375$	0.172881
(y_2, x_7)	$(y_2, x_7) = y_2/ 1+ x_7=0.31875/1+0.46875$	0.217021
(y_2, x_8)	$(y_2, x_8) = y_2/ 1+ x_8= 0.31875/1+0.7625$	0.180851
(y_3, x_1)	$(y_3, x_1) = y_3/ 1+ x_1 = 0.3/1+0.35625$	0.221198
(y_3, x_2)	$(y_3, x_2) = y_3/ 1+ x_2= 0.3/1+0.80625$	0.16609
(y_3, x_3)	$(y_3, x_3) = y_3/ 1+ x_3= 0.3/1+0.3$	0.221198
(y_3, x_4)	$(y_3, x_4) = y_3/ 1+ x_4= 0.3/1+0.5625$	0.192
(y_3, x_5)	$(y_3, x_5) = y_3/ 1+ x_5= 0.3/1+0.625$	0.184615
(y_3, x_6)	$(y_3, x_6) = y_3/ 1+ x_6= 0.3/1+0.84375$	0.162712
(y_3, x_7)	$(y_3, x_7) = y_3/ 1+ x_7= 0.3/1+0.46875$	0.204255
(y_3, x_8)	$(y_3, x_8) = y_3/ 1+ x_8= 0.3/1+0.7625$	0.170213
(y_4, x_1)	$(y_3, x_1) = y_4/ 1+ x_1= 0.60625/1+0.35625$	0.447005
(y_4, x_2)	$(y_4, x_2) = y_4/ 1+ x_2= 0.60625/1+0.80625$	0.33564
(y_4, x_3)	$(y_4, x_3) = y_4/ 1+ x_3= 0.60625/1+0.3$	0.447005
(y_4, x_4)	$(y_4, x_4) = y_4/ 1+ x_4= 0.60625/1+0.5625$	0.388
(y_4, x_5)	$(y_4, x_5) = y_4/ 1+ x_5= 0.60625/1+0.625$	0.373077
(y_4, x_6)	$(y_4, x_6) = y_4/ 1+ x_6=0.60625/1+0.84375$	0.328814
(y_4, x_7)	$(y_4, x_7) = y_4/ 1+ x_7= 0.60625/1+0.46875$	0.412766
(y_4, x_8)	$(y_4, x_8) = y_4/ 1+ x_8= 0.60625/1+0.7625$	0.343972
(y_5, x_1)	$(y_5, x_1) = y_5/ 1+ x_1 =0.65/1+0.35625$	0.479263
(y_5, x_2)	$(y_5, x_2) = y_5/ 1+ x_2=0.65/1+0.80625$	0.359862
(y_5, x_3)	$(y_5, x_3) = y_5/ 1+ x_3= 0.65/1+0.3$	0.479263
(y_5,x_4)	$(y_5, x_4) = y_5/ 1+ x_4= 0.65/1+0.5625$	0.416
(y_5, x_5)	$(y_5, x_5) = y_5/ 1+ x_5= 0.65/1+0.625$	0.4
(y_5, x_6)	$(y_5, x_6) = y_5/ 1+ x_6= 0.65/1+0.84375$	0.352542
(y_5, x_7)	$(y_5, x_7) = y_5/ 1+ x_7= 0.65/1+0.46875$	0.442553

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(y_5, x_8)	$(y_5, x_8) = y_5/ 1+ x_8$= 0.65/1+0.7625	0.368794
(y_6, x_1)	$(y_6, x_1) = y_6/ 1+ x_1$=0.825/1+0.35625	0.608295
(y_6, x_2)	$(y_6, x_2) = y_6/ 1+ x_2$= 0.825/1+0.80625	0.456747
(y_6, x_3)	$(y_6, x_3) = y_6/ 1+ x_3$= 0.825/1+0.3	0.608295
(y_6, x_4)	$(y_6, x_4) = y_6/ 1+ x_4$= 0.825/1+0.5625	0.528
(y_6, x_5)	$(y_6, x_5) = y_6/ 1+ x_5$= 0.825/1+0.625	0.507692
(y_6, x_6)	$(y_6, x_6) = y_6/ 1+ x_6$=0.825/1+0.84375	0.447458
(y_6, x_7)	$(y_6, x_7) = y_6/ 1+ x_7$= 0.825/1+0.46875	0.561702
(y_6, x_8)	$(y_6, x_8) = y_6/ 1+ x_8$= 0.825/1+0.7625	0.468085
(y_7, x_1)	$(y_7, x_1) = y_7/ 1+ x_1$ = 0.65625/1+0.35625	0.483871
(y_7, x_2)	$(y_7, x_2) = y_7/ 1+ x_2$= 0.65625/1+0.80625	0.363322
(y_7, x_3)	$(y_7, x_3) = y_7/ 1+ x_3$= 0.65625/1+0.3	0.483871
(y_7, x_4)	$(y_7, x_4) = y_7/ 1+ x_4$= 0.65625/1+0.5625	0.42
(y_7, x_5)	$(y_7, x_5) = y_7/ 1+ x_5$= 0.65625/1+0.625	0.403846
(y_7, x_6)	$(y_7, x_6) = y_7/ 1+ x_6$= 0.65625/1+0.84375	0.355932
(y_7, x_7)	$(y_7, x_7) = y_7/ 1+ x_7$= 0.65625/1+0.46875	0.446809
(y_7, x_8)	$(y_7, x_8) = y_7/ 1+ x_8$= 0.65625/1+0.7625	0.37234
(y_8, x_1)	$(y_8, x_1) = y_8/ 1+ x_1$= 0.7625/1+0.35625	0.290323
(y_8, x_2)	$(y_8, x_2) = y_8/ 1+ x_2$= 0.7625/1+0.80625	0.217993
(y_8, x_3)	$(y_8, x_3) = y_8/ 1+ x_3$= 0.7625/1+0.3	0.290323
(y_8, x_4)	$(y_8, x_4) = y_8/ 1+ x_4$= 0.7625/1+0.5625	0.252
(y_8, x_5)	$(y_8, x_5) = y_8/ 1+ x_5$= 0.7625/1+0.625	0.242308
(y_8, x_6)	$(y_8, x_6) = y_8/ 1+ x_6$= 0.7625/1+0.84375	0.213559
(y_8, x_7)	$(y_8, x_7) = y_8/ 1+ x_7$= 0.7625/1+0.46875	0.268085
(y_8, x_8)	$(y_8, x_8) = y_8/ 1+ x_8$= 0.7625/1+0.7625	0.223404

F. Calculate the RA Using the following equation: -

$$PHW(r_i, r_j) = \frac{PHW(r_i)}{1+PHW(r_j)} - \frac{PHW(r_i)}{1+PHW(r_i)} \dots (3)$$

For the determination of the attack result see Table X where $r_j = y_i$ & $r_i = x_i$.

TABLE X. RA (X, Y)

Attacks	Attack Power	Tie case	Attack results
(x_1, y_1)	0.217557	0.262673	-0.04512
(x_1, y_2)	0.270142	0.262673	0.007469
(x_1, y_3)	0.274038	0.262673	0.011366
(x_1, y_4)	0.22179	0.262673	-0.04088
(x_1, y_5)	0.215909	0.262673	-0.04676
(x_1, y_6)	0.195205	0.262673	-0.06747
(x_1, y_7)	0.215094	0.262673	-0.04758
(x_1, y_8)	0.255605	0.262673	-0.00707
(x_2, y_1)	0.492366	0.446367	0.046
(x_2, y_2)	0.611374	0.446367	0.165008
(x_2, y_3)	0.620192	0.446367	0.173826
(x_2, y_4)	0.501946	0.446367	0.055579
(x_2, y_5)	0.488636	0.446367	0.04227
(x_2, y_6)	0.441781	0.446367	-0.00459
(x_2, y_7)	0.486792	0.446367	0.040426
(x_2, y_8)	0.578475	0.446367	0.132109
(x_3, y_1)	0.217557	0.262673	-0.04512
(x_3, y_2)	0.270142	0.262673	0.007469
(x_3, y_3)	0.274038	0.262673	0.011366
(x_3, y_4)	0.22179	0.262673	-0.04088

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(x_3, y_5)	0.215909	0.262673	-0.04676
(x_3, y_6)	0.195205	0.262673	-0.06747
(x_3, y_7)	0.215094	0.262673	-0.04758
(x_3, y_8)	0.255605	0.262673	-0.00707
(x_4, y_1)	0.343511	0.36	-0.01649
(x_4, y_2)	0.42654	0.36	0.06654
(x_4, y_3)	0.432692	0.36	0.072692
(x_4, y_4)	0.350195	0.36	-0.00981
(x_4, y_5)	0.340909	0.36	-0.01909
(x_4, y_6)	0.308219	0.36	-0.05178
(x_4, y_7)	0.339623	0.36	-0.02038
(x_4, y_8)	0.403587	0.36	0.043587
(x_5, y_1)	0.381679	0.384615	-0.00294
(x_5, y_2)	0.473934	0.384615	0.089318
(x_5, y_3)	0.480769	0.384615	0.096154
(x_5, y_4)	0.389105	0.384615	0.00449
(x_5, y_5)	0.378788	0.384615	-0.00583
(x_5, y_6)	0.342466	0.384615	-0.04215
(x_5, y_7)	0.377358	0.384615	-0.00726
(x_5, y_8)	0.44843	0.384615	0.063815
(x_6, y_1)	0.515267	0.457627	0.05764
(x_6, y_2)	0.63981	0.457627	0.182183
(x_6, y_3)	0.649038	0.457627	0.191411
(x_6, y_4)	0.525292	0.457627	0.067665
(x_6, y_5)	0.511364	0.457627	0.053737
(x_6, y_6)	0.462329	0.457627	0.004702
(x_6, y_7)	0.509434	0.457627	0.051807
(x_6, y_8)	0.605381	0.457627	0.147754
(x_7, y_1)	0.28626	0.319149	-0.03289
(x_7, y_2)	0.35545	0.319149	0.036301
(x_7, y_3)	0.360577	0.319149	0.041428
(x_7, y_4)	0.291829	0.319149	-0.02732
(x_7, y_5)	0.284091	0.319149	-0.03506
(x_7, y_6)	0.256849	0.319149	-0.0623
(x_7, y_7)	0.283019	0.319149	-0.03613
(x_7, y_8)	0.336323	0.319149	0.017174
(x_8, y_1)	0.465649	0.432624	0.033025
(x_8, y_2)	0.578199	0.432624	0.145575
(x_8, y_3)	0.586538	0.432624	0.153914
(x_8, y_4)	0.474708	0.432624	0.042084
(x_8, y_5)	0.462121	0.432624	0.029497
(x_8, y_6)	0.417808	0.432624	-0.01482
(x_8, y_7)	0.460377	0.432624	0.027753
(x_8, y_8)	0.547085	0.432624	0.114461

For the determination of the attack result see Table XI where $r_j = x_i$ & $r_i = y_i$.

TABLE XI. RA (Y, X)

Attacks	Attack Power	Tie cases	Attack results
(y_1, x_1)	0.470046	0.3893130	0.080733
(y_1, x_2)	0.352941	0.3893130	-0.03637
(y_1, x_3)	0.470046	0.3893130	0.080733
(y_1, x_4)	0.408	0.3893130	0.018687
(y_1, x_5)	0.392308	0.3893130	0.002995

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(y_1, x_6)	0.345763	0.3893130	-0.04355
(y_1, x_7)	0.434043	0.3893130	0.04473
(y_1, x_8)	0.361702	0.389313	-0.02761
(y_2, x_1)	0.235023	0.241706	-0.00668
(y_2, x_2)	0.176471	0.241706	-0.06524
(y_2, x_3)	0.235023	0.241706	-0.00668
(y_2, x_4)	0.204	0.241706	-0.03771
(y_2, x_5)	0.196154	0.241706	-0.04555
(y_2, x_6)	0.172881	0.241706	-0.06882
(y_2, x_7)	0.217021	0.241706	-0.02468
(y_2, x_8)	0.180851	0.241706	-0.06086
(y_3, x_1)	0.221198	0.230769	-0.00957
(y_3, x_2)	0.16609	0.230769	-0.06468
(y_3, x_3)	0.221198	0.230769	-0.00957
(y_3, x_4)	0.192	0.230769	-0.03877
(y_3, x_5)	0.184615	0.230769	-0.04615
(y_3, x_6)	0.162712	0.230769	-0.06806
(y_3, x_7)	0.204255	0.230769	-0.02651
(y_3, x_8)	0.170213	0.230769	-0.06056
(y_4, x_1)	0.447005	0.377432	0.069573
(y_4, x_2)	0.33564	0.377432	-0.04179
(y_4, x_3)	0.447005	0.377432	0.069573
(y_4, x_4)	0.388	0.377432	0.010568
(y_4, x_5)	0.373077	0.377432	-0.00435
(y_4, x_6)	0.328814	0.377432	-0.04862
(y_4, x_7)	0.412766	0.377432	0.035334
(y_4, x_8)	0.343972	0.377432	-0.03346
(y_5, x_1)	0.479263	0.393939	0.085323
(y_5, x_2)	0.359862	0.393939	-0.03408
(y_5, x_3)	0.479263	0.393939	0.085323
(y_5,x_4)	0.416	0.393939	0.022061
(y_5, x_5)	0.4	0.393939	0.006061
(y_5, x_6)	0.352542	0.393939	-0.0414
(y_5, x_7)	0.442553	0.393939	0.048614
(y_5, x_8)	0.368794	0.393939	-0.02515
(y_6, x_1)	0.608295	0.452055	0.15624
(y_6, x_2)	0.456747	0.452055	0.004693
(y_6, x_3)	0.608295	0.452055	0.15624
(y_6, x_4)	0.528	0.452055	0.075945
(y_6, x_5)	0.507692	0.452055	0.055638
(y_6, x_6)	0.447458	0.452055	-0.0046
(y_6, x_7)	0.561702	0.452055	0.109647
(y_6, x_8)	0.468085	0.452055	0.01603
(y_7, x_1)	0.483871	0.396226	0.087645
(y_7, x_2)	0.363322	0.396226	-0.0329
(y_7, x_3)	0.483871	0.396226	0.087645
(y_7, x_4)	0.42	0.396226	0.023774
(y_7, x_5)	0.403846	0.396226	0.00762
(y_7, x_6)	0.355932	0.396226	-0.04029
(y_7, x_7)	0.446809	0.396226	0.050582
(y_7, x_8)	0.37234	0.396226	-0.02389
(y_8, x_1)	0.290323	0.282511	0.007811
(y_8, x_2)	0.217993	0.282511	-0.06452
(y_8, x_3)	0.290323	0.282511	0.007811
(y_8, x_4)	0.252	0.282511	-0.03051

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(y_8, x_5)	0.242308	0.282511	-0.0402
(y_8, x_6)	0.213559	0.282511	-0.06895
(y_8, x_7)	0.268085	0.282511	-0.01443
(y_8, x_8)	0.223404	0.282511	-0.05911

G. *Utilizing GT with 2 players for the determination of winners between MAs: -*

Utilizing PHW system and RA to generate GAF, the red color refers to Nash equilibriums points see Table XII.

TABLE XII. THE GAME THEORY (NASH EQUILIBRIUM)

	y_1	y_2	y_3	y_4	y_5	y_6	y_7	y_8
x_1	-0.04512, 0.080733	0.007469, -0.00668	0.011366, -0.00957	-0.04088, 0.069573	-0.04676, 0.085323	-0.06747, 0.15624	-0.04758, 0.087645	-0.00707, 0.007811
x_2	0.046, - 0.03637	0.165008, -0.06524	0.173826, -0.06468	0.055579, -0.04179	0.04227, - 0.03408	-0.00459, 0.004693	0.040426, -0.0329	0.132109, -0.06452
x_3	-0.04512, 0.080733	0.007469, -0.00668	0.011366, -0.00957	-0.04088, 0.069573	-0.04676, 0.085323	-0.06747, 0.15624	-0.04758, 0.087645	-0.00707, 0.007811
x_4	-0.01649, 0.018687	0.06654, - 0.03771	0.072692, -0.03877	-0.00981, 0.010568	-0.01909, 0.022061	-0.05178, 0.075945	-0.02038, 0.023774	F
x_5	-0.00294, 0.002995	0.089318, -0.04555	0.096154, -0.04615	0.00449, - 0.00435	-0.00583, 0.006061	-0.04215, 0.055638	-0.00726, 0.00762	0.063815, -0.0402
x_6	0.05764, - 0.04355	0.182183, -0.06882	0.191411, -0.06806	0.067665, -0.04862	0.053737, -0.0414	0.004702, -0.0046	0.051807, -0.04029	0.147754, -0.06895
x_7	-0.03289, 0.04473	0.036301, -0.02468	0.041428, -0.02651	-0.02732, 0.035334	-0.03506, 0.048614	-0.0623, 0.109647	-0.03613, 0.050582	0.017174, -0.01443
x_8	0.033025, -0.02761	0.145575, -0.06086	0.153914, -0.06056	0.042084, -0.03346	0.029497, -0.02515	-0.01482, 0.01603	0.027753, -0.02389	0.114461, -0.05911

Calculate the final result between the acceptable attacks of the arguments that supported the MA see Table XIII, X = {x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8} and arguments that supported the MA ¬X = {y_1, y_2, y_3, y_4, y_5, y_6, y_7, y_8}: -

a. x_1 attack on the y_2 ($x_1 > y_2$).
b. x_2 attack on the y_5 ($x_2 > y_5$).
c. x_3 attack on the y_3 ($x_3 > y_3$).
d. x_4 attack on the y_8 ($x_4 > y_8$).
e. x_5 attack on the y_4 ($x_5 > y_4$).
f. x_6 attack on the y_7 ($x_6 > y_7$).
g. x_7 attack on the y_2 ($x_7 > y_2$).
h. x_8 attack on the y_1 ($x_8 > y_1$).

When the X > ¬X, then the MAX is the winner, that is means the increase in local currency value against the dollar under the supply condition without crisis. By using the same way to calculate the other results under other conditions: -

Part one: conditions without crisis, work with demand condition.
Part one: conditions without crisis, work with economic depression condition.
Part two: conditions within the crisis, work with war conditions.
Part two: conditions within the crisis, work with natural disaster conditions.
Part two: conditions within the crisis, work with the pandemic condition.

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TABLE XIII: DELETE NASH STATE AND RE-GAME (MULTI NASH EQUILIBRIUM)

	y_1	y_2	y_3	y_4	y_5	y_6	y_7	y_8
x_1		0.007469, -0.00668						
x_2					0.04227, -0.03408			
x_3			0.011366, -0.00957					
x_4								0.043587, -0.03051
x_5				0.00449, -0.00435				
x_6							0.051807, -0.04029	
x_7		0.036301, -0.02468						
x_8	0.033025, -0.02761							

VI. CONCLUSIONS AND FUTURE WORK

Dung's developed a mathematical model of controversy that can be relied upon to solve most problems, including decision-making. The GAF developed the dung's argumentation framework to give the new model, Combines the dung's system and game theory based on weighted arguments, this system considers the weighted arguments and the weights system as an integral part of the total system. The currency market, like other fields, is affected by the surrounding conditions, this paper focused on the currency market and took it as a case of study, to decide the to buy the currency or not, according to the current exchange, The Nash equilibrium method was used to calculate the final results, When the first result appears, the row and column are deleted, In the same way, the rest of the results were calculated, Where this system have a set of results that represent the acceptable results, There is no objection to these results as they represent the best results depending on the strategy of both players, DGAF good way to calculate the results by adopting all the conditions surrounding the case to calculated, Unlike the GAF method that does not take into account the circumstances surrounding the case, In this system, all the influencing elements are taken into consideration, because they will undoubtedly affect the final result, as the influencing conditions have a very large impact on those results, and it is possible that the same data under two different influencing circumstances give different results, and this is precisely what this work focus It is necessary for our study, as the controversy and its results are indeed governed by the current circumstance, and this is what has been proven in this research. Future works can develop Dung's AF by drawing the acceptable attack after making multi Nash equilibrium.

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