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Business Complexity Resolver Through Mathematical Multi-Parametric (MMP) Tool

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ABSTRACT: Business Complexity is an abstraction for typical business-process problems un-resolvable by simple methods either through logical statement- implications or through mathematical methods or even statistical analysis or Database systems with statistical tools and it is a very strange fabric of Business-Rules verses Outcomes in terms of Commercial parameters such as profitability or credentials or any value-added entity, so a conceptual strategy is adopted to resolve the complexity by devising a “Multi-Parametric Mathematical tool” having multi-parametric relations from Mathematical inference as a solution to complex business problems A mathematical tool is more difficult to design over a semantic rule governing the flexible operation of a business entity or of a sub class of business entity selected as a main representative of the business operation model but it is more accurate towards many decisive relationships and “BRI” Business Rule Indicators

Keywords: Business Complexity, Abstraction, conceptual strategy, multi-parametric relations, Mathematical inference, Logical statement implications, Business Rule Indicator.

1 INTRODUCTION

A business process modeling is an art of Modern Mathematical Sciences under the specific caption of OPERATION RESEARCH as a sub-domain of the mathematical sciences, Operation research has grown-up with smart prompt solutions easily convertible into simulate-able modeling for comparisons and ratings This situation of ORM application is further magnified in terms of its core affectivity when supported by computer sciences, as the distinct virtuality of computerized concepts can be quickly transformed into practical reality Powerful software is available to process any such abstraction into fixed rulings and back-end mathematical procedures to carry out necessary decision extraction A mathematical workout of any complex problem need some break apart of the complexity into smaller complexions which can be easily resolved into simple mathematical relations having some ultimate and decisive outcomes Specific to the general business modeling with multiple complexities a suitable method is required to resolve the complexity at first then its application towards result oriented solution with each part of the process or operation The mechanism of a business model design or devising most suitable model under multiple parameters is an artistic idea not a real commercial or economics based idea because of its inherent nature of opposite business rules conflicting with operation flow But in fact the business model concept is only useful in analyzing and communicating the essence of a business process or for predicting the implications of electronic commerce on an existing business setup. As useful as the concept is, there is a lack of consensus among researchers on the definition of a business model, and on the constructs of the business models for various applications like a thick and dense operation oriented model for a certain business process may fall in the category of very complicated design of a business model but the same model when treated as business objective orientated it quickly transforms itself as a very easy and simple to implement business model because in some structures the Operation Orientation is not considered as an application complicacy rather it is layered over Business Objective Orientation the famous phrase BOO with OOM the operation orientated model is the root for business BOOM Taking the Commercial Scenario of quick and prompt applications of successful business theoretical models there were multiple definitions in comprehensive comparisons Numerous definitions of business models have been proposed, some are abstract (Hamel 2000; Hawkins 2002; Rappa 2006; Timmers 1998; Weill and Vitale 2001) Whilst others are detailed and prescriptive of the business functions (Chesbrough and Rosenbloom 2000; Dubosson-Torbay, Osterwalder et al. 2002; Mahadevan 2000).Research that proposes components of business models is also prolific (Afuah and Tucci 2003; Altand Zimmermann 2001; Chesbrough and Rosenbloom 2002; Hamel 2000; Linder and Cantrell2000; Magretta 2002; Mahadevan 2000; Weill and Vitale 2001). The problem with the early-research in this area is that it was largely driven by researcher perception like Osterwalder et al (2002) synthesized the existing electronic commerce later on referred as (e-Commerce and e-business) and management literature to produce a comprehensive business model ontology(BMO) that specifies, in a structured way, elements and sub-elements of the business model. The BMO is prescriptive in nature, providing element descriptions, associations, attributes and units of measurement aiming to serve as the foundation of management tools. Main guide to introduce a proper tool for complexity resolving is set from Mathematical inferences using partial differentials to account for indexing a rate of change of multivariant function selected to represent a business operation or a stage-wise business process under conditional prefixes such as alternate paths or probable paths or parallel paths as per situation and requirements of the governing rules. A mathematical multiparametric relation describes a set of multiple variables linked with certain governing function or the Base Rule or a base-business rule which can be taken as systems core governing rule when implied the relation as a representative of a business process modeled mathematically.

2 METHOD AND METHODOLOGY

The core method selected is the structuring of a mathematical system to handle the variables of choice in a business process of undeclared complexity using analysis techniques (Separations and exclusions) with common partial rate determining from data bases

3 Structure Of The MMP Tool

A Complex Business Model with simulate-able mathematical representation is selected for case test of structure definition and taken as process outcome [Y(Ÿ)] verses input variables [(x, z, t, f, n)] Where simple business outcome [Y] is associated with complexity outcome [Ÿ] and our target is to remove the complexity without much alteration of the process itself Let by definition the business process of outcome [Y] is in linear correlation with input [x] at some rate coefficient "m" and at certain bias value of the process as "b" thus a general linear relation to simulate the process will be

Start Process……

$$[Y] = (m) * [(x)] + (b) \quad \ldots \quad (1a)$$

Now the next layer of the process takes the effect of another variable which is an input conditioner [z] for the core initial input [x] such that There is a "co-factor" (g) defined by the process input conditioning as a linear link between [x] and [z]

$$\text{Co-Factor } (g) = \partial x/\partial z \quad \ldots \quad (1b)$$

Or in the context

$$\partial x = (g).\partial z \quad \ldots \quad (1c)$$

And the slope coefficient (m) can be estimated by

Slope-Coefficient

$$(m) = \partial[Y]/\partial(x) \quad \ldots \quad (1d)$$

Next layer Process

$$[Y] = (m) * (g) *[(x)] + (b) \quad \ldots \quad (2a)$$

Or it can be rearrange as

$$[Y] = (m) * \{\partial x/\partial z\} * [(x)] + (b) \quad \ldots \quad (2b)$$

Third layer of the process takes (t) into effect for the Process (2b) such that

$$[Y(t)] = \partial [Y] / \partial t \quad \ldots \quad (3a)$$

Now processing at the third layer the outcome [Y] will become [Y(t)] So the representation will now be started with certain complexity of conflicts between various coefficients such that

The outcome

$$[Y (t)] = (m)*(g).\ \partial(x)/\partial t + \partial (b)/\partial t \quad \ldots \quad (3b)$$

With the condition that (m) & (g) are taken unchanged as per process But there is another assumption if the value does take some effect of variable (t) in main process then the representation will become as

The Out come

$$[Y (t)'] = \{\partial (m)/\partial t\}.\{(g).\partial(x)/\partial t\} + \{\partial(g)/\partial t\}.\{(m).\partial(x)/\partial t\} + \partial(b)/\partial t \quad \ldots \quad (3c)$$

Or the more elaborated in terms of base variables

$$[Y(t)']=\{\partial(\partial[Y]/\partial(x))/\partial t\}.\{(\partial(x)/\partial z).\partial(x)/\partial t\} +\{\partial(\partial(x)/\partial z)/\partial t\}.\{(\partial[Y]/\partial(x)).\partial(x)/\partial t\}+\partial(b)/\partial t \quad \ldots \quad (3d)$$

This is just a third layer process with lot of dependency over cross-conflicting variables such as co-factors, conditioners and coefficients

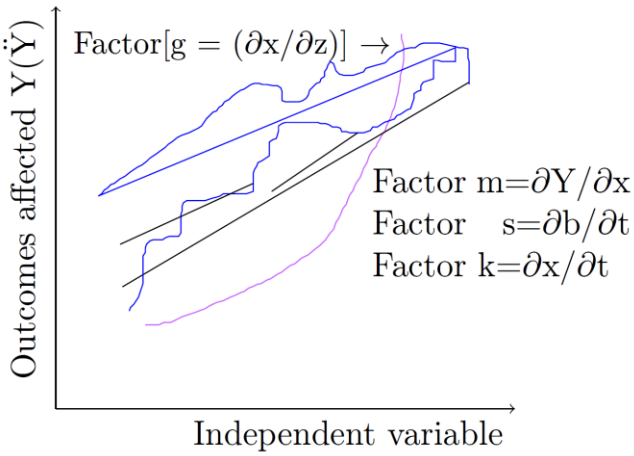
More optimum statement will take effect as

$$[Y(t)']=\{\partial^2[Y]/\partial(x))/\partial t\}.\{(\partial(x)/\partial z).\partial(x)/\partial t\} +\{\partial^2(x)/\partial z)/\partial t\}.\{(\partial[Y]/\partial(x)).\partial(x)/\partial t\}+ \partial(b)/\partial t \quad \ldots \quad (3e)$$

Final Process with feedback (f) and rotational co-operator (n) can be represented as linker functions to the main process equation as (a statement based or description based equation) given as follows {[Y(t)´](n).(f)} = [Y(Ÿ)] where complexity declaration (Ÿ) needs to be resolved by any available or possible inference engine either through statistical methods or logical methods or mathematical tools Let us take a look over frame equation of the business process initially selected for the declaration of a constraint complexity [Ÿ] as associated with normal outcome [Y] in the context of various assumptions made as per Model structured and the target to suggest a proper suitable tool (workable on major cases as referred) Now it is referred as "MMP" Tool (Mathematical- Multi- Parametric Tool) and its core structure will contain a separation step or break-apart step of the complexity declaration equation into smaller groups in such a way that main process is not disturbed at all, and each fraction of the separated relation will be processed to obtain a most optimum value either from real data base available for such processes using the same variables of choice at the inputs

4 Graphical Representation Of The MMP Tool

The graphical scheme used to indicate various operator of MMP-Tool has two dimensional spread out of all five variables selected as the variables of choice for the business process complexity description On one axis the outcome affected by cross conflicts of the variables is plotted against free variable responsible for the complexity scenario and shown by dotted lines whereas the normal behavior of all independent variables affecting the process or in other words Governing the process are shown by thick lines



5 Database Inference

The Data tables are selected with weight assigned values in terms of affectivity factors either direct in relation to the Frame equation of the Business Process or the simulated relation selected for the process itself It is a Multi-Parameter table with Maxima and Minima around a mean value assumed to be closed at the crossing diagonals and cannot be easily averaged out for a singular value to represent the parameter in exclusive value domain Before the Inference decision parameters are considered to take any effect on the business process equations using the data-base rule extraction techniques. Listed here, are the basic assumptions and preliminary definitions of the factors, Coefficients, rate markers and various process weight-assigners of the variables used to represent the core-business process Let [Y] indicates the process out come in linear mode as designed by business model mathematics as dependent variable on an input (the independent variable) in terms of (x) which is to be conditioned by another variable of choice (z) under declared factor (g) [Y(t)] indicates the outcome with time domain dependency in the selected time slots or segmented business flow period (t) to be taken as one cycle period or multiple cycles period averaged on segment (t) taken in standard format (for example per minute, per hour, per day, per week, per month, per year and per larger period of process maturity ([Y(Ÿ)]) indicates the associated complexity as the outcome with either declared factors on the process or some probable outcome in terms of Non-linearity so that the actual linear process outcome [Y] does not remain linear as desired but contains a new value associated with process outcome labeled as ([Y(Ÿ)]) but it does not stand alone as unique value without [Y] and the association is only separable by removing the non-linearity in the process equation ([Ÿ]) indicates cross-conflict relations with non-linear behavior associated with the main process equation ([Y] = f(x) + (b)) which is linear function in just one variable and one constant as bias value (b) but badly affected when multiple rate-changer apply on the business process flow like (z), (t), (f), (n) (∂)()/(∂)() indicates rate determining in partial mode of the link between any two parameters or variables defined by the main business model or the by the design of the process itself, although partial differentials provide a justification on multiple variable mode to assess one by one each parameter keeping others as assumed to be constant but in a complex business process a cross co-relation conflicting the main flow or direction of the process should be accounted for and should be adjusted to work with partial estimators. Factor m = ∂(Y)/∂x indicates slopes of the linear process as the key business function estimator or as the net return on the process itself or as the base-line business formulation labeled as the ultimate gain on a particular input to the process.

(b) = Indicates the bias value of the business process designed, this is the base-line value as well or an initial process input without any business flow or operation or a value to determine the sustainability of the business process (as initial mobilizing capital or the base-investment or the primary process value).

Factor(g) = ∂(x)/∂z indicates rate of change in (x) by (z) which is a primary conditioner for the input (x) and factor (g) estimates the extent of modification required on (x) by the parameter (z) on same scale or unit of measure as of (x) itself

Factor(s) = ∂(b)/∂t indicates any shift in bias (b) in time (t) or the pre-process consumption of primary investment during the time segment (t), this factor (s) is also called the allowance of permission to utilize the available resource of back-up capital to meet the process operation requirement and to be feed back as immediate as possible to sustain the process base line back to the designed value (In semantic sense of the statement, higher the value of (s) the higher will be the complexity and un-stability of the business process and lower the value of (s) the more will be the systems process stability.

Factor(k) = ∂(x)/∂t indicates time based change rate of (x) which not normal practice in common business models as the extent of shift of any input value in a given time slot is itself a complication so to absorb any such change in the process input parameters which happens to be time dependent the factor (k) adjust the input against any shift in the value otherwise the net solution of this variable conflict in time segment issues another constant to be precisely determined like

$$\text{Absolute input } (x) = (\int(\mathrm{k}).\mathrm{dt} + \mathrm{k_c})$$

Since [x(t)] becomes another function now in terms of factor (k) and new integration constant (k_c) needs more data tables to evaluate the precise value to be suitable enough for main variable (x) behavior on the process function Coefficient K_1 Stands for numeric value associated with [Y] Available from the data tables to match closest approximation as numeric value fitting in resolving the complexity Coefficient T_1 Stands for numeric value associated with [Y]´ Available from the data tables to replace the non-linear curve by adjustments on decrement or increment in the principal value required to be treated as linear

Coefficient K_2 Stands for numeric value associated with [x] To be evaluated again from the data tables to suggest a prime value replacement to resolve up or down trending along the process flow attached with the input behavior (x)

Coefficient T_2 Stands for numeric value associated with [x]´ Once it takes a shift in the value over time segmented operations, the business process takes another turn from linearity towards non-linearity and may destabilize the process for un wanted shifts as ([x]´) which may be justified for a very short time benefit of the positive values but if there is any and equal

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chance of reversal then the process cannot sustain beyond base line so the coefficient is used to limit thederivative ([x]´) within its natural range of variance picked up by the row cross column estimation

COEFFICIENT K_3 Stands for numeric value associated with [Ÿ] The Process complexity at cross-conflicting variables cannot be just resolved without adjusting the loop gap up to minimum acceptable level by either putting some additive constant to its base value or by subtracting the pulling down constants on to the base function One way to determine Coefficient K_3 is to use linear regression tool from statistical regression but the more dependable is to use partial rate estimator on both functions which are responsible for cross confliction So the estimation of K_3 takes an average integration outcome of both function indirectly and is used as numeric value within the permissible limits for [Ÿ] declaration complexity statement

COEFFICIENT T_3 Stands for numeric value associated with [Ÿ]´ it is the time segmented value estimated over a long interval to observe any status change in the function representing the actual conflict with any variable of a business process designed Since it is purely data dependent it can only be examined via similar mathematical function as for example Hyperbolic Sine function or Hyperbolic Cosine Function for complex variable The application of manipulator tool to extract rule-based value of any two data connective variables is a suitable practice to get an optimum numeric value of these coefficients Estimation using (POSCN: Point of Sales commodity number) in Column number 1, (TSC: Time segment Coefficient) T_1 in Column number 2, (APOSCN: Adjacent Point of sales Commodity number) in Column number 3, (VSC: Variable Sales Coefficient) K_1 in Column number 4.

***TABLE* 1**

Parametric index values for the coefficient K3 and coefficient T3

T1	K1	T2	K2	T3	K3	T4	K4
1303	0.049	1302	0.075	1302	0.052	1301	0.041
1323	0.198	1321	0.195	1326	0.264	1329	0.234
1351	0.643	1345	0.568	1354	0.875	1354	0.661
1376	1.170	1379	2.053	1375	1.599	1376	0.955
1402	4.258	1396	3.426	1406	3.064	1404	3.054
1429	4.257	1425	7.262	1427	7.192	1422	3.545
1453	12.33	1447	9.235	1452	7.562	1448	12.54

6 MMP TOOL ALGORITHM

Selected Methodology to resolve non-linearity in a complex business process is the technique of adjusting index of slope or rate of change between any two related data points either by adding or by subtracting the coefficient value back to the target value. A logical flow to resolve the complexity is designed as per selected algorithm Step-1 Select two corresponding para-meters from data table of graphical curve

Step-2 Check slope between two conservative points

Step-3 Further check conservative slope of the next adjacent points

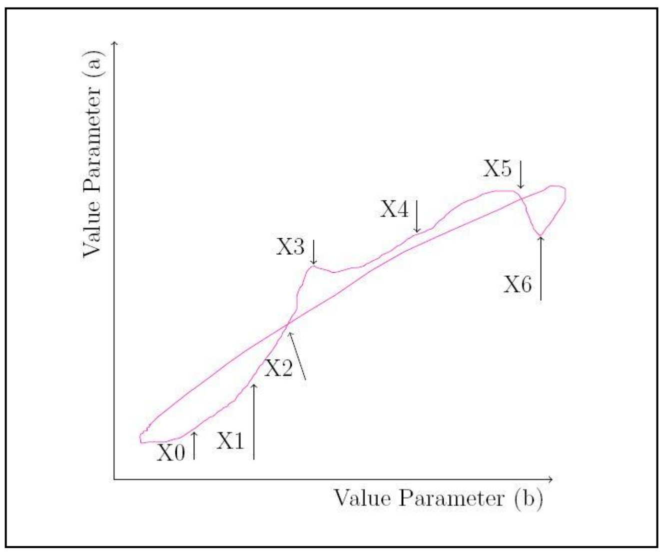
Step-4 Compare the magnitudes of slope variables if it increasing (+) or decreasing (-)

Step-5 Adjust index value by multiplier as closed as possible to linear slope variables

Step-6 Amend the rule which generate data table for graphic curve

Step-7 Recheck slopes randomly between any two points and in the vicinity

Step-8 The value must come to zero if nonlinearity is resolved.



7 PROCESS ELABORATION

Points (X_0), (X_1), (X_2), (X_3), (X_4), (X_5) and (X_6) are selected on the curve are the values corresponding to the effective outcome for inputting parameters (b) in relation of the process outcome parameters (a)For each data point (X) of the table the corresponding data points of parameters (a) are (Y_0), (Y_1), (Y_2), (Y_3), (Y_4), (Y_5) and (Y_6) respectively. The correlation corresponding is given by mathematical formulation by linear law.

$$(Y)_1 = K_m(X) + L_m \qquad (1)$$

Where parameter (a) has the value as $(Y)_1$ and parameter (b) is the value (X) responsible for process delivery into business model projected slope (K_m) on pre-process bias (L_m) Next value for the process adjacent to above equation is the replica of

(1)

$(Y)_2 = K_n(X) + L_m + L_n$ (2)

Similarly next consecutive process will follow its replica as (3)

$(Y)_3 = K_p(X) + L_m + L_n + L_p$ (3)

Segmented correction over slope variable will now be applied to keep average slope unchanged from a pre-determined bias value like follows If first slope is compared with primary slope which is theoretically linear then either it is increasing so as to give the index as positive

Slope index α = [(Change in slope value)/

(Primary slope value)]x(100) (4)

So the process is now

Slope Index $\alpha = [(K_n - K_m) / K_0] \times (100)$ (5)

8 Result And Discussion

The main target of this exercise is to offer a business solution under normal course of operation research technique. The main tool is the mathematical analysis and parametric treatment on the thick non-homogenous business data as the operation research tools emphasis on high profitability keeping all efforts and expenditures to a minimum. In an ultimate business process the scale of profitability is very flexible due to the complexity in hiring, lending, accruing, resources, managing the structural and process variable. The main hurdle in such a process is the non-determinate state of the profitability. The MMP-Tool when adjusted to such an ultimate business process it's successfully recovered on the marginal process and its sustainable rate within the expected linearity. The test case of marble business company having multiple parameters which are interdependent with each other is selected for MMP-Tool as follows: The data from the sales and expenditure ledger is taking and each statistical composition is labeled as point (X_0), (X_1), (X_2),(X_3), (X_4), (X_5) and (X_6) indicating the flaws and over shoots on another parameter corresponding to above six point labeled as (Y0), (Y_1), (Y_2), (Y_3), (Y_4), (Y_5) and (Y_6). The first two points compared for the change of slope which is drastically lower than the expected slope the pre bias value of parameter Y is L_0 From the data gram the value of Y, X and L is follows

TABLE 2

Statistical Composition between X and Y

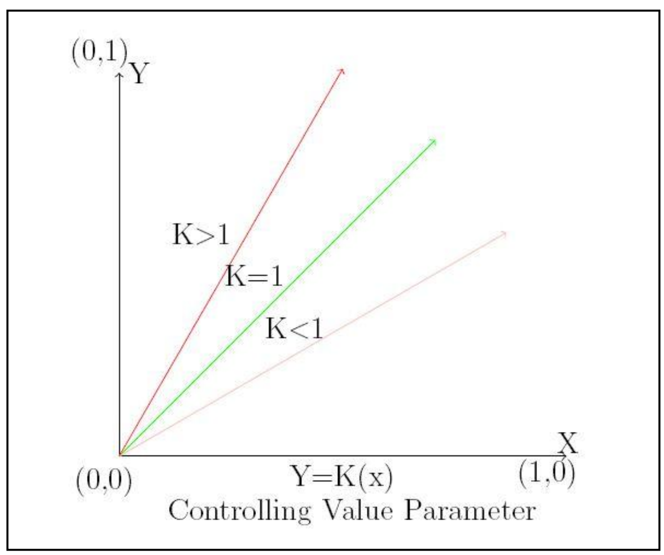
X	Y		L_m
0.013	0.7913		1.15 (Initial)
0.033	0.8313	+(0.04)	1.17
0.053	0.8713	+(0.04)	1.19
0.073	0.9413	+(0.07)	1.24
0.093	1.0313	+(0.09)	1.31
0.113	1.0213	-(0.01)	1.34
0.133	1.0413	+(1.02)	1.34
0.153	1.0713	+(0.03)	1.35
0.173	0.9813	-(0.09)	1.46
0.193	0.9413	-(0.04)	1.52
0.213	1.0113	+(0.07)	1.57

The above values of pre bias are adjusted by the difference of the parametric value X, Y. The Value of L_m is taken from,

$$Y' - K(X)' = L_m$$

The Co-factor "K" for the test case is taken as 1. Similarly the next value of pre bias is added by above equation.

Here
$Y' = Y_2 - Y_1$ and $X' = X_2 - X_1$



8 Conclusion

The testing using the algoritm selected for (MMP-Tool) confirms the correction and the required result from the data. This proposal is to induct the MMP-Tool is based upon few business examples with multiple parameters affecting the business

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process. Although the complexity of a business process cannot be easily resolved by simple - mathematical relation but I tried to simplify the trained and the outcomes of business process depending upon various parameters such as initial investment. The purchasing power of the investment the equivalent values of the commodities, services, facilities provisions, infrastructure, liquidity of money, profit scaling, loss management, accident and emergency. A Plan business process depend upon two major factors the first is designed parameters and the second factor is the consequential parameters. The MMP-Tool is specially selected to test the both parameters in indexing and scaling. The conclusive statement about the MMP Tool is "An Averaging Slope correcting the complexity found very successful in all test cases"

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