CALCULATING PSYCHOLOGY (MAPPING PROFILES OF MIND) OF BUSINESS INTERACTION BETWEEN CONSUMER AND ANY GIVEN BUSINESS: A "STANDARDIZED" MATHEMATICAL MODELLING TO FORMULATE THE BUSINESS AND CONSUMER

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Abstract:

A good bonding or understanding in between seller and customer of a business is point of focus of this study. What a seller thinks and what a customer thinks on a given business are to be the two sets of variables of this study. A culmination of the two sets would provide up to bringing or constructing a model that will be able to determine a resultant value of their joint wars or thoughts. Such a modeling work has been explained by the study and it should be a new in the history of the nature of the study. The study has lots of future scopes from developing ideas to know customers (more) better, transparent and closely to correcting views of a seller towards the journey of the business concerned. This study may be a gateway to transform the qualitative management analysis to its quantitative nature. This should formulate the psychology of reckoning of business from both sides, customer and a business seller, simultaneously. The modeling is a new concept-building framework that would increase the methodology in manifolds of further researches.

Keywords:
Business interaction, Customer, Seller, Interaction matrix, Interaction modeling, Interaction bonding matrix.

INTRODUCTION
A seller is always in an attempt to design and sell the business in a good compilation of all associated attributes [Sharma and Singhania. 2016]. On other side, customers take all his/her psychological or biological or else variables into a better output to buy the business [Heinonen, 2018; Naumann, et al., 2020]. Attributes and variables are related to a business concerned and human qualities or stimuli respectively. There are two processes that are usually to be seen in

any business market, one is business-selling process (taken by a marketer or business itself) and other is purchase making process of human (or customer). Two processes jointly make an interaction [Tumbull, 1996] between seller and customer and such joint interaction is hereby termed by symbiosis or symbiotic process. As considered in this study, such a process continues to go on again and again, resulting eventually to a cyclic nature of the process (Figure 1). This cyclic nature is important to the interest of the business after all [Biemans, et al., 2022; Harvard Business Review. 2006; Lemon and Verhoef, 2016]. A marketer could have made, in many instances [Fukunaga, et al., 2016; do Prado, et al., 2018], initiatives in making better competitive edges in the business market by using the behaviour of this cyclic nature of the symbiosis. But, every time it is seen that a gap persisting with many causes, between sales and promoting the business (marketing), makes up the cycle (even more) stronger [Rehme, 2012; McColl, 2020; Ahluwalia, et al., 2000; Camacho, et al., 2022]. This present study has explained theoretically about how such a symbiotic nature can be turned into an anticipating model to get a basis of the symbiotic condition of business.
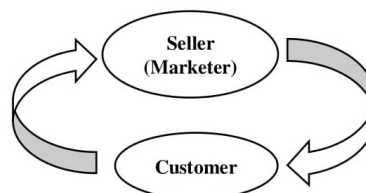

Figure 1: Symbiotic Cycle

Background of the study

Attributes are important to a marketer about how to make them implemented through a business product or service. For customers, it is the variables which take on to a reaction (symbiotic) while come in contact with the attributes (Table 1). Such a reaction can be thought of or perceived or said as an effect of the symbiosis.

Table 1: The symbiotic factors

Sl.	Symbiotic partners	Functional attributes or variables
1	Seller	• Qualitative and quantitative. • Qualitative: Quality, Taste, Image, Color, Packaging, Reward, Value, Social status, Motivational psychology, Store outlet, Branding, Labeling, Style or attitude, Post benefits, etc. • Quantitative: Price, Quantity or Volume, Production output, Sales quota, etc.
2	Customer	Need fulfillment (short-term and long-term), Persuasive output, etc.

Customers usually think in his/her all possible ways (psychologically and/or biologically etc.) before the purchase, through the reaction. This reaction, resembling the symbiotic nature (condition), is to be *irrespective* of customer or seller, rather it is better spelt as *simultaneous*. Because like customers there should be the responsibility (symbiotic) to seller also. In business, seller spreads all required attributes to customers and both then in a mutual interaction, make an *overall symbiotic reaction* (which is of simultaneously reactive nature), causing to a final outcome for the business (whether the business) to be purchased or not. Let's term this overall reaction as *symbiotic centricity* which can form an interaction matrix for *interaction matrix model* (IMM). This basis of symbiotic reaction or IMM is solely to the consideration for constructing the study. There can be two kinds of such centricity as,

1) Customer centric or centricity
   [S= f(C)].
2) Seller centric or centricity
   [C = f(S)].

Each of the two centricity is to deliver IMM, described afterwards.

For the first centricity, it can be well understood by its mathematical functional expression as,

$S = f(C) = B1$.

where,

C = level of purchasing proposition of customer by magnitude or value (numerical).

S = level of selling by magnitude or value (numerical) of seller, marked by B1 for the study's elaboration.

It is quite now clearly understandable that seller finalizes its level of selling attributes that should be spread along or provided among the customers in the business market. So, there must be a conversion or transformation mechanism that may be applied to for customers' variables and seller's attributes. Suppose, there is a magnitude of 5 unit available as an overall impact of all variables of customer in a given business market and corresponding to such 5 unit there should be a 10 unit of overall impact of all attributes of seller for the business given. This proportion may be anything say, it may be 5 to 3 or 5 to 10 or 2 to 8 or such, respectively. For information, such a proportion is to be subject to an accomplishment of objectives of a business. Also, such a value of S can be represented in terms of cost or budget disbursed against various promotional programmes, compensation, incentives, discount etc. in marketing or business management. For a business to sustain, such a budget against value of S should be lesser than sales achieved (revenue) in order to realize a business profit after all.
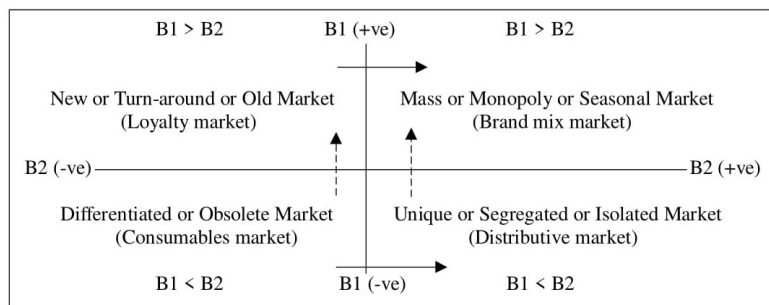

Figure 2: Symbiosis Matrix Market (of Interaction)

For the second centricity, it is mathematically as, $C = f(S) = B2$; where, S = level of selling proposition, by magnitude or value (numerical), of one or more than one seller in a given business market; C = level of purchasing, by magnitude or value (numerical), of customer marked by B2 for the study's elaboration.

In this second centricity, customer should reckon himself/herself about the purchasing decision after seeing several levels of selling proposition of one or more than one seller. Similar way of having a transformation mechanism is considered to be valid in this case also like above centricity. So, in this way, we can have a particular centricity for a given business. Conversely, there should be two kinds of business proposition by the two kinds of centricity as explained. Figure 2 shows such discriminating conditions among businesses over matrix formed in between B1 and B2 wherein firm arrow lines show an improvement in business and dotted arrow lines indicate a jump onto a different definition of business from a given business.

Unit magnitude of symbiosis effect (of symbiosis relation) by each symbiotic centricity can be determined. Such magnitude would be able to reflect an effect of interaction or symbiosis between C and S, symbiotically. This symbiotical approach has been described in the methodology of this present study which would turn into a model (called as interaction matrix model, IMM) to specify a field of magnitudes (B1 or B2) caused after a symbiosis. Such a model would unfold a spectrum of behaviour of symbiotical effect between C and S and characterizes nature of business (Figure 2). This model would help to business marketer in arranging marketing programme and subsequently reckon on accountability to minimize or optimize unnecessary economical wastes of business management.

Table 2: Symbiosis and its features

Mechanisms of symbiosis (U or Y)	Multiplication	Addition	Division	Subtraction
What is symbiosis as function?	Joint exchange of factors			
Symbiosis partners	Customer and Seller			
What happens during symbiosis?	A transformation or conversion of factors (of attributes or variables)			
A symbiosis an interaction?	Yes			

This present study would discuss the following as objectives of the study –

- To investigate symbiosis or interaction between customer and seller in a given business. To explain the symbiotical relation by respective magnitude of customer and seller.

- To make a conversion or transformation basis of building factors of C and S into a numerical magnitude. To facilitate the magnitudes into mathematical approaches to get them defined and well narrated.

- To construct IMM model, defining to illustrate the possibility of realizing the symbiosis with more vibrant closeness scientifically.
- To explain implications of the study to other than marketing management.

METHODOLOGY

The study would observe the interaction between customer (C) and seller (S) as a symbiotic relationship, in a given business where other interactions such as interactions of S with competitors, suppliers, country's economy (macro & micro) standards, etc. are assumed to be constant. In many cases, these other interactions are found be fluctuating although [Baptista, et al., 2016; Karthikeyan and Nagasamy, 2019; Mabrouk, 2020; Tescari, 2022; Chatain, 2010; Brito, 2017; Žabkar, 2001]. Subjectively, promotional changes (improvements) are not away surely [Ziliani, 2005; Patro, 2023; Pembi, et al., 2017] and it's nothing but a cause of symbiotic condition or reaction to happen, based on centricity, as mentioned before.

However, during the symbiosis, there should be an exchange of factors (attributes and variables) between C and S, through a mechanism of transformation or conversion. For an example, for C such an exchange would take place by transforming attributes of S, by using his/her own stimuli. This is symbiotic reaction that occurs within a sphere of C or S. This sphere is built up by psychological and biological stimuli. This is similarly applicable for S also, as because all attributes of business are arranged, prepared and designed by S who is also a human indeed, subjected by business objectives. While C takes care of his/her own need fulfilments, S also makes all possible attempts to take the business to a position of selling or persuasive selling. So, it is obvious that there should be a symbiosis of human stimuli occurring for a cause of business. Table 2 gives various features of symbiosis operation.

It is war of stimuli or stimulus exchanges or objective accomplishment by stimulus' best efforts of responses. Such a symbiosis operation may be called as a good one if both C and S are with best optimization or such can reach at their own destination with little hazards or discomforts. Such optimization can follow various mechanisms from severity of functional expressions to simple arithmetical operations like addition, subtraction, multiplication, division, etc. Each of such operations could define a *symbiosis status* existing between C and S (Table 3). Each of two kinds of centricity, as explained earlier, would be individually applicable by these mechanisms. So, business characters would be possible to be found out for centricity as specific to a business condition.

Table 3: Determination of symbiotic effect

Symbiotic level of		Symbiotic alternatives (or symbiosis status)	Final Output
Seller	Customer		
S1	C1	(S1YC1YC*)U(S1YC2YC*)U(S1YC3YC*)U . . . , U(S1YCnYC*)	Best *optimization* value
S2	C2	(S2YC1YC*)U(S2YC2YC*)U(S2YC3YC*)U . . . , U(S2YCnYC*)	
S3	C3	(S3YC1YC*)U(S3YC2YC*)U(S3YC3YC*)U . . . , U(S3YCnYC*)	
…	…	…	
Sn	Cn	(SnYC1YC*)U(SnYC2YC*)U(SnYC3YC*)U . . . , U(SnYCnYC*)	

Symbiosis Status

After a mechanism by stimulus responses as explained is over, we can get or realize a status or effect of symbiotic relationship, by magnitude. Say for centricity S = f(C), we can get the status or effect for a set of levels. For this centricity as shown by Table 3, there are a number of levels or magnitudes of C for a given level of S. The tabulation illustrates the levels of C as C1, C2, C3, …, Cn for a level of S such as S1. This is a set that delivers a status or effect through the mechanism by stimuli and such mechanism is assumed like the form as, (S1YC1YC*)U(S1YC2 YC*)U(S1YC3 YC*)U . . . , U(S1YCn YC*);
where, symbol Y: symbiosis mechanism or operand (immediate).

symbol U: symbiosis mechanism or operand (subsequent).

Operations of Y and U are already mentioned by Table 2, as mechanisms.

symbol C*: relative contribution that is a contribution considered (by S, in case of S = f(C)) during an interaction or symbiosis between C and S. Such a contribution may be same or different, by magnitude, for all interactions in a given set.
So, such a status of symbiosis would definitely result to a magnitude that is sufficient to reflect or define an effect of interaction or symbiosis. In this way, we can determine for all sets of symbiosis the magnitude of symbiosis status and such status for a given all sets is the symbiosis status which could also be termed as symbiotic alternatives because of possibility or potential of each of the alternatives to act on or get deleted out from the selection of finalization or an optimization (Table 3). A best value by optimization or else could provide the status magnitude as a final magnitude of symbiosis status for the centricity or stimulus operation.

### Distinguishing between symbiosis matrix and interaction matrix

Depending on centricity type, two different conditions are formed. For customer centricity, that is S = f(C), it is about seller or business nature. For seller centricity, that is C = f(S), it's the nature of customer. We can get a matrix in each of two types of centricity. Table 4 initiates with the meaning of required components of the matrix.

Table 4: Interaction matrix and its components

Interaction matrix function	S = f(C)		C = f(S)	
Matrix components	S (+ve)	C (+ve)	S (-ve)	C (-ve)
Meaning	Seller reactive	Customer reactive	Seller less reactive	Customer less reactive
Implication to	Business behaviour		Customer behavior	
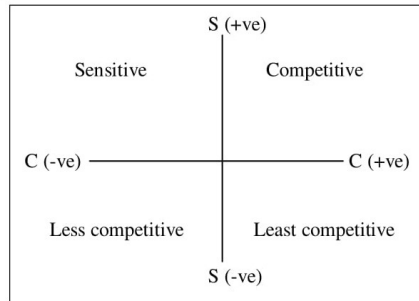
Figure 3.1: Interaction matrix for S = f(C)
(Seller behaviour or character)
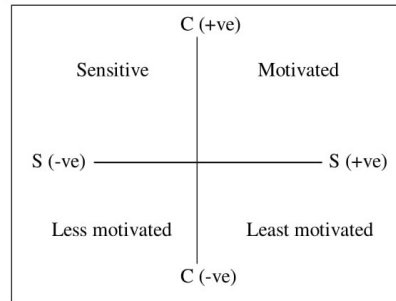
Figure 3.2: Interaction matrix for C = f(S)
(Customer behaviour or character)

Figure 3: Interaction Matrix (for market competitiveness and motivation)

Each centricity has one dependent component and it should indicate significance of its functional relationship by its own magnitude. This significance can be obtained by implication by a matrix formation by using components. There could be several characters of business and customer that are possible to be found out. Figure 3 has illustrated this with respect of competitiveness (for seller or business), in Figure 3.1, and motivation level (for customer), in Figure 3.2. These two illustrations are for two types of centricity and each of which is an interaction matrix. These two interaction matrices once thought of simultaneously together would result to what has been explained as Symbiosis matrix illustrated in Figure 2. So, interaction between C and S would define business character finally, defining correlative measures (against matrix quadrants) initiated by C and S for a given business.

For information, a symbiosis status is linked to interaction matrix first and then to symbiosis matrix.

Construction of Interaction Matrix Model (IMM)
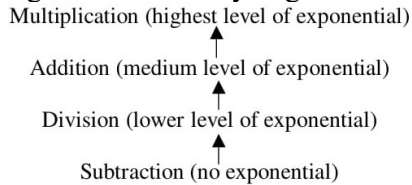
All necessary tabulations are given in Appendix A.

A magnitude-based model has been constructed in this present study, by using methodology as explained against Table 3, Table 4. All the magnitudes are all about the symbiosis status resembling an effect of symbiotic relationship between C and S. To do this, a set of magnitudes against each of C and S has been assumed as p1 and p2 as suitable (Table A.1). Onto the assumed values or magnitudes, mechanisms explained in Table 2 have been applied. There are four tabulations, Table A.1 to Table A.4 (of Appendix A), for mechanism against four arithmetic operations. Each of the mechanisms would render to a specific nature or behaviour of symbiosis status or relationship. Such charts of magnitudes or values have then been transferred to calculations average and weighted average which could be said as the model basis of IMM. All chart magnitudes for average and weighted average basis are plot by trend-line profiles (Figure A.1 and Figure A.2 respectively) whose mathematical expressions (brought out by microsoft excel spreadsheet) are the model definitions for IMM, given in Table A.5. With this, the construction of IMM is complete and it is hereby expected to work on any real-life business conditions, onto utilizing interaction or symbiosis status.

RESULTS AND DISCUSSION

Following discussions can be made based on findings of the study -

A framework construction of the symbiosis nature has been explained by in the study and by the model so formed could be useful to the business results or anticipation.

Intensity of the symbiosis so explained and obtained, it can be now evidently said that there should be denomination or ranking of such intensity. Figure 3 is shown with such explanation.

Multiplication (highest level of exponential)

⬆

Addition (medium level of exponential)

⬆

Division (lower level of exponential)

⬆

Subtraction (no exponential)

Figure 4: Degree of symbiosis (Symbiotic effect by degree)

As there should be an inclusion of psychological stimuli (represented by attributes, of variables both quantitative and qualitative nature) in making a decision over a given symbiosis relation, such kind of study would be helpful to characterize all business participants about their degree or level of participating and/or accounting psychology. Also, there could be several other participants like supplier, competitor, various business influencers etc. etc. whom could at well be taken into constructing the model by the methodology as given by present study.

Instead of various operator (of arithmetic nature), application of statistics and probability or fuzzy theory or set theory etc. can be applicable as well for more insight derivation or exploration of the study. Best application of mathematics is highly needful and there is immense scope of it for expressing the symbiosis. It would clear out many insights which have been in dearth of unknowing and exploring for a nation grow.

Entirely the study is suitable to anticipation of customer from eye of customer and vice-versa if proper database is available. This database may also be generated by the IMM itself for a given field of business, as well.

CONCLUSIONS

The study is a fantastic culmination of perspectives of customer and seller. For a given business, their mutual culmination would be the resulting (as effect) by the interaction in between them.

A business happens means a symbiosis matrix must have occurred. That symbiosis is to be IMM. In fact, there should always be an existence of such symbiosis (or IMM) behind every business or exchange of transaction.

It becomes a need of the hour to have IMM for a given field of business or market, to a business manager/marketer. For this, framework of IMM should provide the constructing layout so as to generate and get the results.

What a customer thinks in response to a given status (advertising etc.) of business should be determined through joint effort of seller and customer. That scope of iterations should be kept handy or ready to a marketer and a business can be, at well, checked by a generated chart of values of IMM (as given in by the study). This provision may be, in near future, brought into a standardization or ready-made basis corresponding to a kind of business.

Lots of the scope of researches are available to the study, right from mathematical inclusions to psychological uplifts, as required for the business.

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APPENDIX A

Table A.1: Addition mechanism effect

Sl.	p1	Magnitude of Interaction Matrix for a given value of p2 of									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	**1**	2	3	4	5	6	7	8	9	10	11
2	**2**	3	4	5	6	7	8	9	10	11	12
3	**3**	4	5	6	7	8	9	10	11	12	13
4	**4**	5	6	7	8	9	10	11	12	13	14
5	**5**	6	7	8	9	10	11	12	13	14	15
6	**6**	7	8	9	10	11	12	13	14	15	16
7	**7**	8	9	10	11	12	13	14	15	16	17
8	**8**	9	10	11	12	13	14	15	16	17	18
9	**9**	10	11	12	13	14	15	16	17	18	19
10	**10**	11	12	13	14	15	16	17	18	19	20
Sum		65	75	85	95	105	115	125	135	145	155
Average		6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5
Variance		82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5
standard deviation		9.08	9.08	9.08	9.08	9.08	9.08	9.08	9.08	9.08	9.08
weightage average		8	9	10	11	12	13	14	15	16	17

^ sum of p1 = 55; p1 and p2: proposition magnitude.

Table A.2: Subtraction mechanism effect

Sl.	p1	Magnitude of Interaction Matrix for a given value of p2 of									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	**1**	0	-1	-2	-3	-4	-5	-6	-7	-8	-9
2	**2**	1	0	-1	-2	-3	-4	-5	-6	-7	-8
3	**3**	2	1	0	-1	-2	-3	-4	-5	-6	-7
4	**4**	3	2	1	0	-1	-2	-3	-4	-5	-6
5	**5**	4	3	2	1	0	-1	-2	-3	-4	-5
6	**6**	5	4	3	2	1	0	-1	-2	-3	-4
7	**7**	6	5	4	3	2	1	0	-1	-2	-3
8	**8**	7	6	5	4	3	2	1	0	-1	-2
9	**9**	8	7	6	5	4	3	2	1	0	-1
10	**10**	9	8	7	6	5	4	3	2	1	0
Sum		45	35	25	15	5	-5	-15	-25	-35	-45
Average		4.5	3.5	2.5	1.5	0.5	-0.5	-1.5	-2.5	-3.5	-4.5
Variance		82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5
standard deviation		9.08	9.08	9.08	9.08	9.08	9.08	9.08	9.08	9.08	9.08
weightage average		6	5	4	3	2	1	0	-1	-2	-3

^ sum of p1 = 55; p1 and p2: proposition magnitude.

Table A.3: Multiplication mechanism effect

Sl.	p1	Magnitude of Interaction Matrix for a given value of p2 of									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	**1**	1	2	3	4	5	6	7	8	9	10
2	**2**	2	4	6	8	10	12	14	16	18	20
3	**3**	3	6	9	12	15	18	21	24	27	30
4	**4**	4	8	12	16	20	24	28	32	36	40

5	**5**	5	10	15	20	25	30	35	40	45	50
6	**6**	6	12	18	24	30	36	42	48	54	60
7	**7**	7	14	21	28	35	42	49	56	63	70
8	**8**	8	16	24	32	40	48	56	64	72	80
9	**9**	9	18	27	36	45	54	63	72	81	90
10	**10**	10	20	30	40	50	60	70	80	90	100
	sum	55	110	165	220	275	330	385	440	495	550
	average	5.5	11	16.5	22	27.5	33	38.5	44	49.5	55
	variance	82.5	330	742.5	1320	2062.5	2970	4042.5	5280	6682.5	8250
	standard deviation	9.08	18.17	27.25	36.33	45.41	54.50	63.58	72.66	81.75	90.83
	weightage average	7	14	21	28	35	42	49	56	63	70

^ sum of p1 = 55; p1 and p2: proposition magnitude.

Table A.4: Division mechanism effect

Sl.	p1	Magnitude of Interaction Matrix for a given value of p2 of									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	**1**	1.000	0.500	0.333	0.250	0.200	0.167	0.143	0.125	0.111	0.100
2	**2**	2.000	1.000	0.667	0.500	0.400	0.333	0.286	0.250	0.222	0.200
3	**3**	3.000	1.500	1.000	0.750	0.600	0.500	0.429	0.375	0.333	0.300
4	**4**	4.000	2.000	1.333	1.000	0.800	0.667	0.571	0.500	0.444	0.400
5	**5**	5.000	2.500	1.667	1.250	1.000	0.833	0.714	0.625	0.556	0.500
6	**6**	6.000	3.000	2.000	1.500	1.200	1.000	0.857	0.750	0.667	0.600
7	**7**	7.000	3.500	2.333	1.750	1.400	1.167	1.000	0.875	0.778	0.700
8	**8**	8.000	4.000	2.667	2.000	1.600	1.333	1.143	1.000	0.889	0.800
9	**9**	9.000	4.500	3.000	2.250	1.800	1.500	1.286	1.125	1.000	0.900
10	**10**	10.000	5.000	3.333	2.500	2.000	1.667	1.429	1.250	1.111	1.000
	sum	55.00	27.50	18.33	13.75	11.00	9.17	7.86	6.88	6.11	5.50
	average	5.50	2.75	1.83	1.38	1.10	0.92	0.79	0.69	0.61	0.55
	variance	82.50	20.63	9.17	5.16	3.30	2.29	1.68	1.29	1.02	0.83
	standard deviation	9.08	4.54	3.03	2.27	1.82	1.51	1.30	1.14	1.01	0.91
	weightage average	7.00	3.50	2.33	1.75	1.40	1.17	1.00	0.88	0.78	0.70

^ sum of p1 = 55; p1 and p2: proposition magnitude.
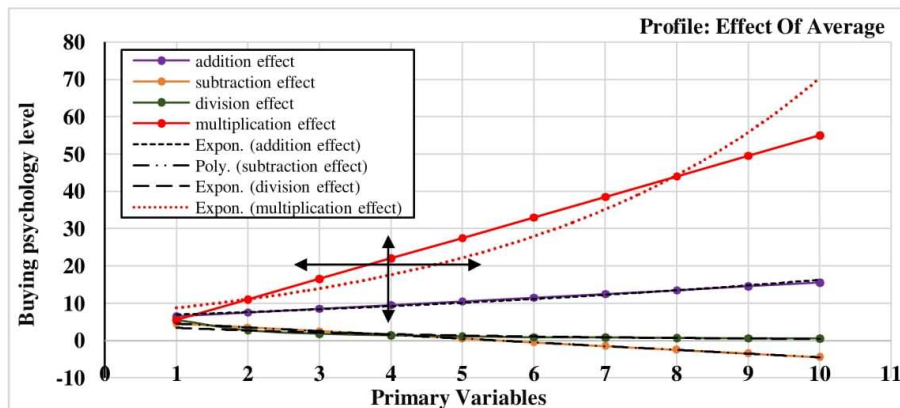
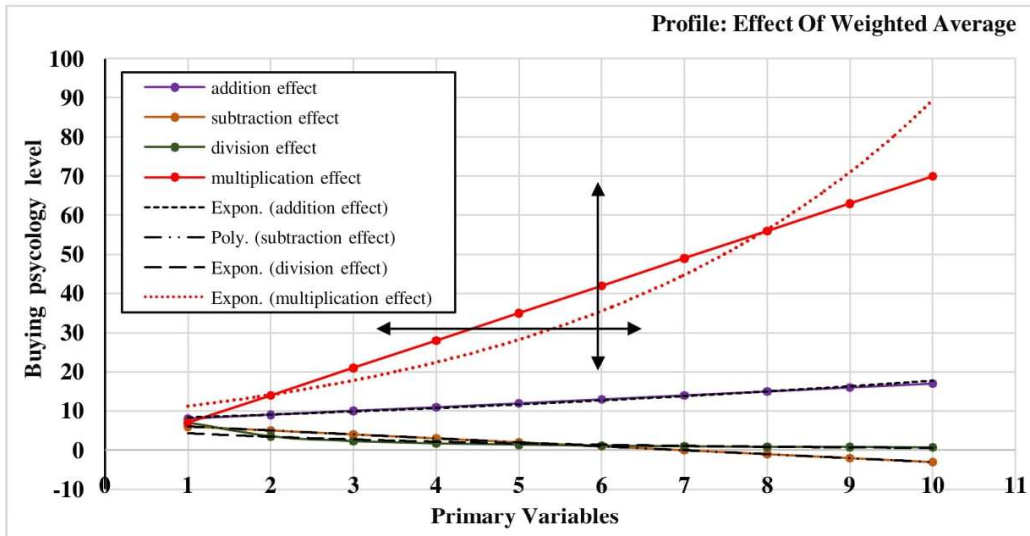**Figure A.1: Symbiosis status profiles by average basis**

Figure A.2: Symbiosis status profiles by weighted average basis

Table A.5: Model profile expressions of IMM

Sl.	Name of effect by mechanism	Average basis of effect	Weighted Average basis of effect	Trend type
		Trend-Line Equation (With R^2 Value)		
1	Addition	$y = 6.2928e^{0.0949x}$ $R^2 = 0.9859$	$y = 7.7156e^{0.0827x}$ $R^2 = 0.9892$	Exponential trend
2	Subtraction	$y = -x + 5.5$ $R^2 = 1$	$y = -1E{-}16x^2 - x + 7$ $R^2 = 1$	Polynomial trend
3	Multiplication	$y = 7.0143e^{0.2304x}$ $R^2 = 0.9247$	$y = 8.9273e^{0.2304x}$ $R^2 = 0.9247$	Exponential trend
4	Division	$y = 4.3126e^{-0.23x}$ $R^2 = 0.8564$	$y = 5.4888e^{-0.23x}$ $R^2 = 0.8564$	Exponential trend

$\hat{y}$ = level of buying psychology; x = magnitude of primary variables.