PREDICTIVE MODEL ON INTANGIBLE ASSETS NEGOTIATION: LINEAR REGRESSION ANALYSIS

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Abstract— Intangible assets negotiations require a considerable amount of preparation before engaging in Negotiation. In many cases, such assets provide additional challenges on business negotiations, due to the difference of perception on values between parties. This article investigated N=922 Brazilian business negotiations, spread all over the five regions in Brazil, through statistical analysis. One hypothesis was investigated through correlation, ANOVA, Durbin-Watson test, and linear regression to determine whether the relationship between open and close values. Key findings pointed out a statistical significance in such a case, and the null hypothesis was rejected, meaning significant differences between open and close values regarding the sample studied. Finally, this work provides scholars with a sound perspective on intangible assets negotiation, as well as the implications of these results for managerial practice.

Keywords— Business negotiations, intangible assets negotiation, open, close value, anchoring effect

I. INTRODUCTION

Intangible assets negotiation is as a result of this defined as a negotiation in which parties deal with variations of intellectual, structural, and relationship capital, emotional attachment to a tangible asset under Negotiation, such as an internet Uniform Resource Locator (URL). Therefore, in this article, two parties engaged in a Type I Negotiation [1]. The same two-party-one-issue role-play simulation on business negotiations was applied to N=922 Brazilians.

The characteristics of the deal value (hereafter close value) in comparison to the opening value (hereafter open value), from business negotiations, are not well-grounded, regarding intangible assets negotiation. Therefore, the objective is to investigate (i) the relationship between the variables open (OPEN) and close values (CLOSE). Is there any causal relationship between them? Moreover, is there any significant anchoring effect between an initial move in a given negotiation, regarding the close values? Is it possible to predict a close value (dependent variable) from an initial value in mainly intangible assets business negotiation cases? In the following sections, these questions are answered.

Research on business negotiation activities has attracted scholars' attention ed regarding the negotiation processes [1]; [46]; [47]; [53]; [55]; [56]; [57-59], and [60]. Thus, the purpose of this study is to investigate a particular case in business negotiations, where intangible assets are more relevant than real ones.

The conclusions provide scholars, practitioners, managers, students, business negotiators with new insights into the particularities of the business negotiation process.

In the next sections, the groundworks are discussed. Then, the study design is presented, in which a single hypothesis was tested, and the null hypothesis rejected regarding the sample investigated. The results were further analyzed through correlation, linear regression, Durbin-Watson, and statistical residuals tests, among others. Finally, the results are discussed, and future research indications compile this work.

II. CONCEPTUAL FOUNDATIONS

Negotiation is defined as "Negotiation involves several key components including two or more parties to a negotiation, their interests, their alternatives, the process and the negotiated outcomes (p. 232) [61]. Additionally, Negotiation is defined as "a process of communicating back and forth for the purpose of reaching a joint decision." [47] (p. 20)

The case negotiation presented to all research subjects is a Type I negotiation, supported by the Four-Type Negotiation Matrix, according to Dias [1], as illustrated in the following Figure 1:

Fig.1: - The Four-Type Negotiation Matrix. Source: Dias, 2020. Reprinted under permission.

Observe in Figure 1, the Type I negotiation, by which subjects engaged in the negotiations investigated. In this study, the Shapiro-Wilk Test for Normality was applied due to the data set size. Figure 2 depicts the equations for the Shapiro-Wilk test:

$$W = \frac{\left\{\sum_{i-1}^{n} a_i (x_{(n-i+1):n} - x_{i:n})\right\}^2}{\sum_{i=1}^{n} (x_i - \bar{x})_2},$$

Fig.2: - Shapiro-Wilk Normality Test equations

The Linear Regression equation is illustrated in Figure 3, as follows:

$$Y = \beta 0 + \beta 1.Xi + \varepsilon$$

Figure 3: - Linear regression equations.

Observe in Figure 3 the terms of the linear regression formula: Y is the dependent variable (CLOSE); β0 is the population Y-intercept, and β1 is the population slope coefficient. Both are the linear components of the equation. X is the independent variable (OPEN), and ε is the random error term. The statistical hypothesis followed a correlation and linear regression analysis, stated as follows:

Hypothesis

H_o: negotiation close value is not affected by open value in the intangible assets business negotiations. In sum, a negotiation process can be ended at any deal value, with no connection with the opening value. Therefore, **H_0** = μCLOSE=μOPEN, or H_0 = μCLOSE - μOPEN= 0, where: μCLOSE is the mean deal value negotiations, while μOPEN is the negotiation opening value.

H_a: The negotiation close value is affected by open value in the intangible assets business negotiations. In other words, the opening value interferes with the result of the business negotiation under scrutiny.

III. METHODS AND RESEARCH DESIGN

This article is a quantitative study, following a deductive rationale, positivistic approach. The research design is introduced as follows: first, a two-party role-play simulation was applied to 1,844 Brazilian business negotiators, from all five Brazilian regions. In total, 40 cohorts were investigated. In total, N=1922 intangible asset business negotiations were investigated. Data were analyzed through SPSS 26 (Brazilian Portuguese), later translated into English.

The negotiations were held from March 2019 to July 2020. Out of the 1,844 participants, 59 percent were male, 41 percent female, 72 percent in the middle to high-level management positions, and 18 percent occupied low-level management positions. In this sample, 90 percent are employed, from which 90 percent Caucasians, 55 percent married, 45 percent single, divorced or others; 70 percent is 25-35 years old, 20 percent above 35 years old; 25 percent speak a second language mostly English. All negotiations were conducted in calm places with proper illumination (1,000 lux minimum), with no significant background noise that could somehow interfere with the outcomes. The negotiations occurred within and outside business hours.

The same negotiation case was applied to all 1,844 participants. The students were instructed to read their roles and to engage directly in the Negotiation. For a full set case instructions, dynamics, and mechanics on the case applied, see Dias, and Duzert [36]. The subjects were instructed to register (i) the opening, and (ii) the close values. The raw data was input into SPSS and further analyzed. In the next section, the results and analysis were compiled for appreciation.

IV. RESULTS AND ANALYSIS

Observe in the following Figure 4 the first test conducted: the Shapiro-Wilk normality test, employed due to the number of samples investigated (N>100):

Normality Tests

	Kolmogorov-Smirnov[to]			Shapiro-Wilk, Shapiro-Wilk		
	Statistics	Gl	Sig.	Statistics	Gl	Sig.
OPEN	,173	922	,000	,872	922	**,000**
CLOSE	,152	922	,000	,871	922	**,000**

a. Lilliefors Significance Correlation

Fig. 4: - Normality tests. Source: SPSS 26

Observe in Figure 4 p<0,05 for both variables. Initially, a correlation test was conducted to investigate the relationship between variables. The Shapiro-Wilk test results pointed out the necessity of Spearman correlation, as shown in Figure 5, and the scatter plot is depicted in Figure 6, as follows:

Correlations

			Open	CLOSE
P Spearman	Open	Correlation Coefficient	1,000	.950**
		Sig. (2 ends)	.	,000
		N	922	922
	CLOSE	Correlation Coefficient	.950**	1,000
		Sig. (2 ends)	,000	.
		N	922	922

**. The correlation is significant at level 0.01 (2 extremities).

Fig. 5: - Spearman correlation test. Source: SPSS 26

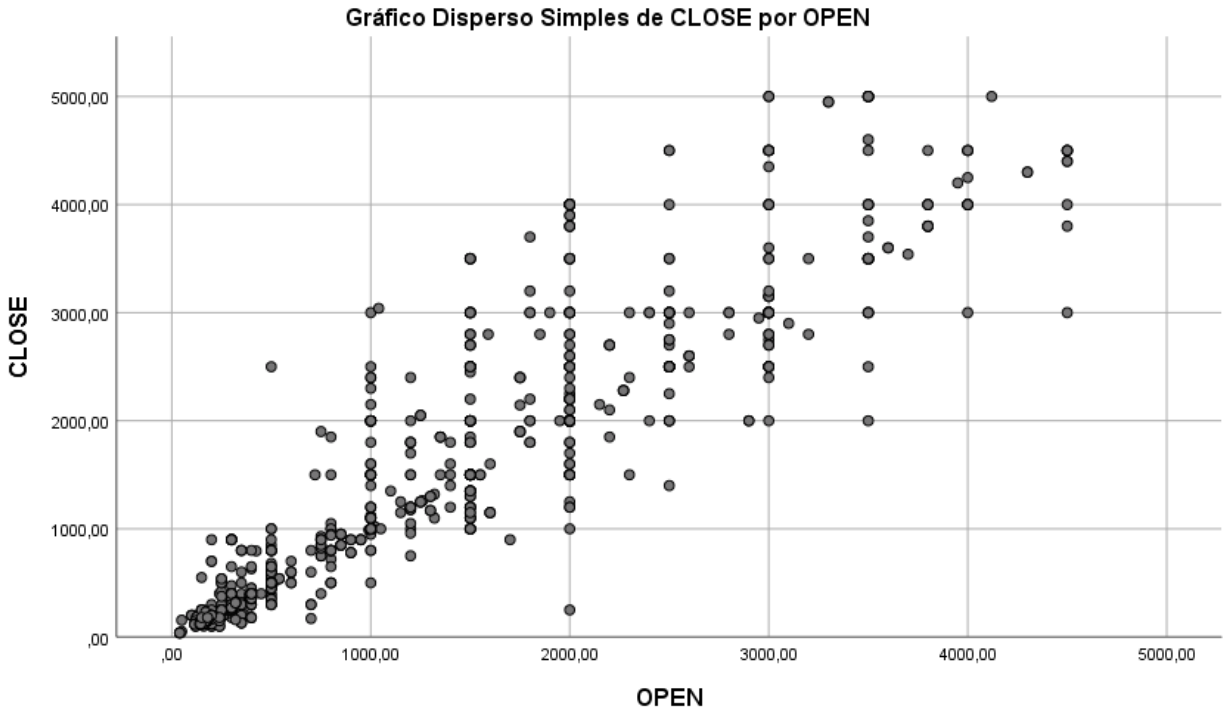

Fig. 6: - Scatter plot. Source: SPSS 26

Observe also in Figure 6, the data dispersion, diagonally distributed, indicating the strong positive correlation between the variables OPEN and CLOSE, as illustrated in the previous Figure 5. Spearman correlation showed a strong, positive correlation between OPEN and CLOSE variables (ρ = 0,950; p<0,001). In sum, the two variables are strongly connected: if the open value increases, the close value increases.

Observe also in Figure 6 the dispersion of the data, diagonally distributed, indicating the strong positive correlation between the variables OPEN and CLOSE, as illustrated the the previous Figure 5. Spearman correlation showed a **strong, positive correlation** between OPEN and CLOSE variables (ρ = 0,950; p<0,001). In sum, the two variables are strongly connected to each other: if open value increases, close value also increases.

Furthermore, the study complied with the number of predictors for linear regression (N>20). The negotiations are also independent. One result has no impact on the other result. The case is the same, but the results vary among parties. Figure 7 illustrates the Durbin-Watson test outcome (Durbin Watson = 1,965), indicating the independence among the residuals, one of the pre-requisites for the linear regression to be suitable for the present research, as follows:

Model[B] Summary

Model	R	R squared	R square set	Standard estimation error	Durbin-Watson
1	.916[to]	**,838**	,838	514,74896	**1,965**

a. Predictors: (Constant), OPEN

b. Dependent Variable: CLOSE

Fig. 7: - Model Summary. Source: SPSS 26

Observe in the following Figure 8, the results of the ANOVA test. In this case, the ANOVA null hypothesis implies no difference in the predictors, regarding the model adjustment. Open values do not interfere with or predict a closing value under the circumstances investigated and related to the results revealed from the data set. The significance of the ANOVA test reveals that the null hypothesis is rejected (p<0,001). Therefore, open value is a predictor of the close value in this particular study. The linear regression showed the open value predicts the close value in the negotiation case investigated [F (1, 920) = 4773,870,p< 0.001; R2 = 0,838)]. Therefore, **H_0**: closing value indedependent on the predictor value (opening value). **H_a**: closing value depends on the forecaster (opening value) p<0.001, the null hypothesis is rejected.

ANOVA[a,b]

Model		Sum of Squares	Df	Middle Square	Z	Sig.
1	Regression	1264915551,486	1	1264915551,486	**4773,870**	**.000[b]**
	Residue	243769175,389	920	264966,495		
	Total	1508684726,876	921			

a. Dependent Variable: CLOSE

b. Predictors: (Constant), OPEN

Fig. 8: - ANOVA. Source: SPSS 26 extracted from the data source.

Coefficients[a]

Model		Non-standard coefficients B	Error Error	Standardized coefficients Beta	T	Sig.
1	(Constant)	75,003	25,525		2,938	,003
	Open	1,079	,016	,916	69,093	,000

a. Dependent Variable: CLOSE

Fig. 9: - Linear Regression Coefficients. Source: SPSS 26 extracted from the data source.

Figure 9 illustrates the linear regression model equation coefficients', essential for the linear regression formula. The anticipated close value, in thousand of BRL, corresponds to 75,003 + 1,079. (open value), also represented in thousand BRL.

Regarding the investigation of the residuals, Figure 10 illustrates the interval between residual errors (-3 to +3), while Figure 11 depicts the histogram of the residuals, normally distributed.

Residual statistics[to be]

	Minimum	Maximum	Average	Deviation Error	N
Predicted value	118,1638	4930,5405	1393,4364	1171,92805	922
Residue	-1983,01990	1885,49243	,00000	514,46944	922
Error Predicted value	-1,088	3,018	,000	1,000	922
Residual Error	-3,852	3,663	,000	,999	922

a. Dependent Variable: CLOSE

Fig. 10: - Residual Statistics. Source: SPSS 26 extracted from the data source.

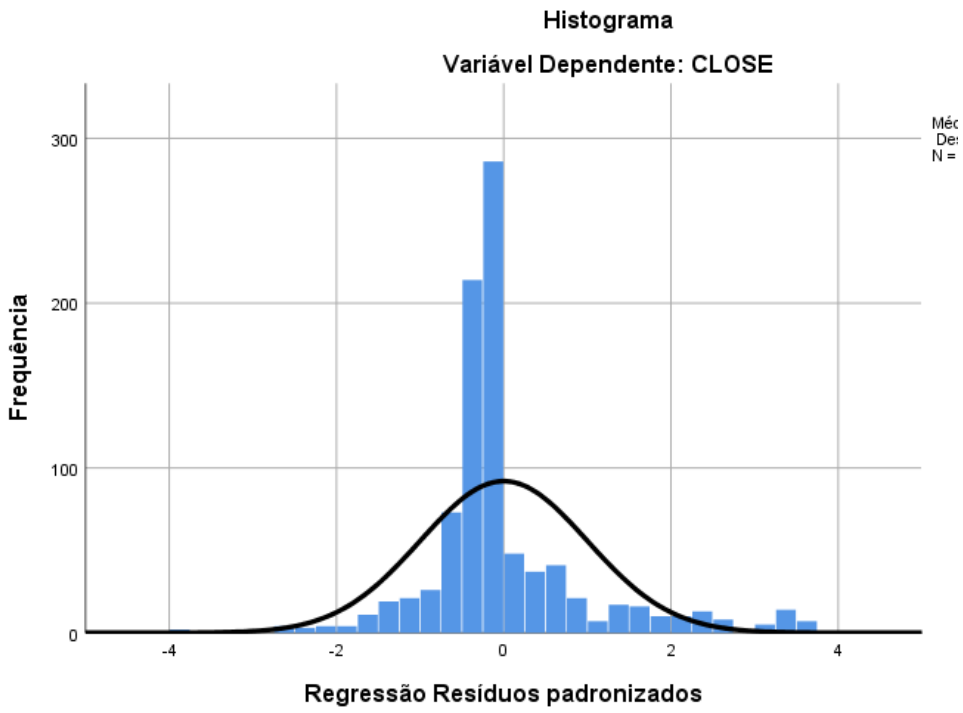

Fig. 11: - Residuals' Histogram. Source: SPSS 26 extracted from the data source.

V. CONCLUSION

Theoretical Implications

This research tested the hypothesized relationships between OPEN and CLOSE variables regarding the intangible assets business negotiations under investigation, using data collected from negotiators participating in executive training sessions on MBA courses dispensed in Brazil. The correlation and linear regression are significant, and a scrutiny of the hypothesized relationships in the negotiations provided consistent support on reinforcing the effectiveness of the variables' distinctions analyzed.

Evidence showed the absolute importance of opening moves within a negotiation anchoring effect or "a cognitive process where negotiating parties tend to rely on the first information offered - usually an initial bid" [36] (p.3). However, it could be a false story, too.[62]

Implications for managerial practice

The conclusions have implications in several fields of business negotiation research, such as (i) brewing industry [5], [14]; (ii) streaming video [29]; (iii) civil works [19]; (iv) mining industry [35]; (v) vitiviniculture industry [33]; (vi) public transportation [44]; (vii) debt collection negotiations [28],[36], [41]; (viii) aerospace and civil aviation [7], [12], [13], [27], [31], [32]; [22], to name a few.

Negotiation practitioners can benefit from the study's conclusions in many ways. First, be careful with the initial offer, when intangible assets are negotiated. The opening value may determine the deal value.

Study Limitations

This study is limited to the intangible assets, Brazilian business negotiation scenario. Other countries or scenarios may differ in findings. The conclusions are also limited to the data investigated within a controlled, artificial environment. Real-life negotiations may differ in results and may be influenced by the absence of trust among parties, different levels of competition, and ultimately escalation. Finally, this research is limited to Type I Negotiation [1]. Other negotiation types may differ in performance.

VI. FUTURE RESEARCH

Future research is encouraged by the intangible asset negotiations Type III, III, and IV [1]. Finally, future research should address other variables, such as the impact of luminance on business negotiation performance, for instance, to assess, for instance, a multiple regression on such variables.

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APPENDIX I -NEGOTIATION MAP COMPLETE

APPENDIX II - NEGOTIATION MAP SAMPLE

Mapa de Negociação - Caso Limite Orçamentário - Gabarito

Interesses (José Antônio)	Alternativas (José Antônio)	Opções (José Antônio)	Pessoas-chave
Psicológicos Satisfação pessoal com a obtenção da verba de aumento de 8% para implementar a nova organização aprovada pelo Comitê Executivo e manter a admiração que meu time tem por mim.	Marcar uma reunião diretamente com o CEO, ou o Comitê Executivo e apresentar todos os dados e o projeto completo, mostrando o apoio de outro setor muito importante. (alternativa arriscada)	Proposta de aumento de 8% (mínimo de 7,7%) Atingir as metas no ano seguinte Mostrar que ele aumentará a produtividade e lucratividade como aconteceu com a ABA LTDA A verba pode ser liberada em etapas, de acordo com o projeto, a fim de reduzirem-se os riscos da operação e manter o controle do processo sob a influência e controle diretos do Bruno. Apresentação de projeto detalhado de modificações no DRH	Vice-Presidente de orçamento e finanças – Bruno Vice-Presidente do Departamento de Recursos Humanos – José Antônio
Materiais Mostrar resultados satisfatórios no aumento da lucratividade e reformulação do departamento de RH da empresa.			**Local(is) da Negociação** Sede da empresa ou via zoom
Processuais Resolver de forma que fique bom DRH, acarretando aumento de produtividade e faturamento de toda a empresa.			**Critérios usados** Recursos viriam do aumento de produtividade da empresa em 3%, para serem realocados como investimento

Interesses (Bruno)	Alternativas (Bruno)	Opções (Bruno)	Elementos-chave do acordo
Psicológicos Preocupação com a repercussão política negativa a respeito de um aumento suplementar diferenciado para o departamento do José Antômio.	Procurar o presidente da empresa para buscar apoio político e não conceder os 8% ao José Antônio (alternativa arriscada)	Crescimento anual de investimento de 5% ou menos Reduzir o quadro de funcionários para compensar a verba extra Reorganizar os setores para que pessoas agreguem mais funções aos seus setores Conceder aumento escalonado entre 5% a 8%	**Meta** 8% (7,7% mínimo)
Materiais Manter todos os setores operacionais com baixo custo, mantendo a lucratividade da empresa. Manter os 5% de aumento.			**Métrica** Aumentos quadrimestrais de 1%. Se atingir a meta no primeiro quadrimestre, avançamos para o segundo, e assim por diante. Em caso de não atingimento da meta no primeiro quadrimestre e subsequentes, volta-se ao patamar inicial. (opcionalmente, aumentos semestrais de 1,5%)
Processuais Manter o mesmo critério para todos os departamentos da empresa. Conceder aumentos somente em reuniões com o conselho de administração da empresa.	**ZOPA (Estimada)** Entre 5% e 8% de aumento.		**Prazo** 1 ano, aumentos de 1% a cada quadrimestre) (opcionalmente,1 ano, aumentos de 1,5% a cada semestre)

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Journal of Xidian University

https://doi.org/10.37896/jxu14.7/161

ISSN No:1001-2400

Mapa de Negociação

Interesses (meus)	Alternativas (minhas)	Opções (minhas)	Pessoas-chave
Psicológicos 1. ATENDER 2. MELHORAR DESEMPENHO DA EQUIPE.	1. NÃO TEM SAÍDA. TEM QUE AUMENTAR. 2. VOLTAR PARA ANTIGA EMPRESA.	1. OFERECER REDUÇÃO EM OUTROS INSUMOS. 2. TENTAR CONVERSA COM CEO. BUSCAO UMA SOLUÇÃO.	JOSE ANTÔNIO DO DRH E BRUNO ORÇAMENTO
			Local(is) da Negociação
Materiais REORGANIZAÇÃO DOS PROCESSOS AUMENTO EM PRODUTIVIDADE			SEDE DA LIMA CASTER E NO SETOR ONDE TEM MAIOR NÚMERO DE FUNCIONÁRIOS.
			Critérios usados
Processuais TREINAMENTO SELEÇÕES DEMISSÃO NOVA CONFIGURAÇÃO DO ESCRITÓRIO			
Interesses (da outra parte)	Alternativas (da outra parte)	Opções (da outra parte)	Acordo entre as partes
Psicológicos AGRADAR O CEO. CONFIANÇA.			Meta AUMENTO DO ORÇAMENTO EM 8% E MÍNIMO 5%.
Materiais 1. ANÁLISE DE DOCUMENTOS DA CONTABILIDADE. 2. RECURSOS, 3.			Métrica PAGAMENTOS DAS NOTAS DO SETOR E RETORNO FINACEIRO.
Processuais: REUNIÃO COM GESTOR DA ÁREA. 1. 2.	ZOPA (Estimada) 5 a 8%		Prazo 15 DIAS PARA FECHAR E 6 MESES PARA IMPLEMENTAR.

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