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Economic Value as a Determinant of Success and Failure of M&A in the Technology Industry

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Abstract: The study comprehensively analyzes the impact of mergers and acquisitions in the technology industry across various domains. It utilizes diverse and global organization datasets to cover domestic and cross-border M&A. The research focuses on estimating the economic value to predict the success and failure of an M&A. The determinants identified in the study demonstrate a positive correlation between the economic value and the success or failure of organizations post-M&A. This model, once validated, could serve as a valuable tool for decision-making in M&A transactions within the technology sector, potentially enhancing the success rate of such transactions.

Keywords: mergers, acquisitions, patent intensity, technology

Introduction

It is difficult to conclude with certainty whether mergers and acquisitions (M&A) are value-creating or value-destroying. This study is focused on empirical studies that determine the health of mergers and acquisitions in the technology industry. The study involves the development of two empirical models to identify the success criteria of an acquisition deal. Each of these models is based on the defined determinants of the success and failures of an M&A. An analysis of the combination of domestic and cross-border mergers and acquisitions is being done. The performance of a technology organization post-M&A is measured in the form of the economic value added as a result of an M&A transaction. Economic value is a measure of benefit from an organization's goods or services for an end-user post-M&A. The study focuses on finding the right combinations of the determinants to calculate the values and help decision-makers make the decision.

Economic value is an essential success factor for an organization. Economic value added (EVA) is a performance parameter of the success and failure of a business. EVA is defined as the difference in the net operating profits of the organization and the overall cost of capital used to reap the operating profit. EVA has an essential role in the organization's overall business performance measurement to evaluate the organization's success and failure. EVA estimates an organization's economic value generated over the organization's stakeholders (Mohanty, 2006). The conclusions have been drawn on the reasons for the success and failure of an M&A transaction in the technology industry, using the two parallel empirical studies' two parameters.

Research Gap

The study aims to determine the success and failure parameters for M&A. The questions revolve around the two major areas, as defined before. The technological benefits and economic benefits together play an essential role in the decision to acquire. Based on the history of technology organizations from an acquisition point of view, the success and failure factors are always a puzzle for decision-makers. Both the value of the transaction and the overall economic viability are essential.

- What are the determinants of M&A in technology areas?
- What are project success criteria for M&A from the perspective of the economic value of the organization?

An analysis needs to be conducted to investigate the success factors identified in the literature for M&A transactions. The study aims to identify the economic determinants of success in an M&A. The technology-related and economic value-related hypotheses have been determined based on the literature's specific motives and determinants. Empirical models with the data type used in the analysis have been explained. Detailed empirical analysis, results, and conclusion are discussed in length to open up some questions for further research.

Literature Review

The literature related to mergers and acquisitions covers various scenarios, domains, and diverse industries and the determinants and factors responsible for the success and failure of an M&A transaction. There are mixed opinions about M&As in the global context for the determinants. Before the determinants are studied for the performance analysis of M&A, it is essential to define the success and failure of the M&A transactions as per the literature. Healy et al. (1992) studied successes and failures and identified that the technology industry's financial parameters are the standard of successful M&A transactions. They defined success and failure together to understand the difference. Hietala et al. (2003) mention that it is difficult to identify the determinants of the profitability of the organizations post-M&A. Rosenzweig (2006) concluded that the success or failure of M&A depends upon the goals based on which the M&A transaction was done. If M&A has not met the goals that have been set, then it will be a failure in the M&A transaction. Kumar and Rajib (2007) defined successful M&A as if everything else remains the same, and the net asset value of the owners of acquiring companies is going up. Any increase in profitability implies success, and any adverse change means failure. Bosecke (2009) identified that to measure the success of M&A in more dynamic industries, like technology, it should be analyzed that the goals of either the organization, acquirer, or target are to be followed.

Some contrary opinions were arrived at in the past based on specific cases related to economic value. Angwin and Savill (1997) determined that 43% and 54% of M&As were considered failures or not worth repeating. Weber et al. (2013) determined that a strategic match is essential to benefit from synergies between the two organizations and achieve M&A success. Bohlin et al. (2000) also determined the success rate of M&As by less than 20%. Cornnell (2010) also studied the parameters and determinants used as empirical indicators or data analysis units. This whole study is responsible for identifying determinants of success and failure rates of the M&A. In the United States of America, 40 to 50% of M&As are failures, 34% of M&A transactions in the study showed lesser revenue than pre-M&A, 46% of transactions in the study resulted in lesser profits than pre-M&A, and fewer than 20% have shown success from all the management's motives of M&A. Jemison et al. (1986) on the contrary argued, the decisive game is considered necessary but, not a sufficient condition for M&A success.

Palich et al. (2000) also found that the linkage between diversification and performance is inverted U-shaped. It was discovered after synthesizing more than three decades of research. In different words, moderate levels of diversification provide higher performance compering to limited or excess diversification. Idris Qaderi and Ali Bouzeid (2017) identified the premium paid as the primary determinant of the value of the acquisition. According to Kitching (1967), who interviewed 22 companies and their top executives involved in 69 acquisitions, one critical success criterion for M&A performance is the price paid by the acquiring company. Roll (1986) concluded that if the acquiring company cannot compensate for an overpayment with synergy effects, the M&A will fail financially. DePamphilis (2012) concluded that overpaying increases the obstacles to earning the cost of capital. Generally, the higher the premium, the harder it is for the acquiring company to create shareholder value.

From an economic or financial value point of view, some positive views exist in the literature. Stewart (1991) derived that the economic value added or EVA could increase in three cases: whether the same investment increases the organization's profits, whether the new investment the organizations earn more than the older investment, and whether the new investment is separate from the organization's core business for better opportunities. As per Díaz et al. (2009), based on the study of 49 M&As from 1995 to 2004, bidders paying more than a maximum of 21 percent could be overpaying for the deal. Dang(2011) derived that an adequate level of liquidity is positively related to company profitability. Higher liquidity would allow an organization to deal with unexpected contingencies and handle its obligations during low profits. As per Bruner's (2004) study, the organization's performance in the case of M&A, three results are possible: The overall value is created, the overall value is conserved, and the overall value is destroyed. The historical literature in the late nineties in other industries extensively analyzed M&A performance and the success and failure parameters, resulting in an increase or decrease in performance. Gregory (1997) and Dash (2004) have found that acquisitions into related industries have done better economically than acquisitions in unrelated industries.

Data Sources and Methodology

The details about the mergers and acquisitions have been picked up from the Institute of mergers, acquisitions, and alliances (IMAA) database. The information about M&A transactions in this study, especially for the technology organizations, was collected from the Orbis (Bureau Van Dijk) database. The sample includes M&A activities with completed, confirmed, announced, and pending status from January 2005 to December 2015. Standard industrial

classification (SIC) is the 4-digit code that categorizes organizations' industries based on their business activities and core values. For the sampling data, the criteria for selection is that the M&A transactions have target companies in technology sectors according to the SIC code criteria, and the acquiring organization must be a public organization with shares listed on the stock exchange. The two M&A-specific databases also provide some characteristics of the target and acquiring firms, such as name, industry sector, or transaction history. The data is used to clarify how M&A investments impact respective organizations and the information technology sector.

The sample data here consists of only technology companies. Unlisted firms are eliminated due to the unavailability of financial information. The obtained dataset was screened and reduced by excluding deals from the sample if the target organization does not relate directly to the technology sector. Transactions involving several acquiring companies were also removed from the sample due to the lack of information about each organization's number of shares. Firms from developed and emerging countries were picked up in the sample. The M&As these organizations are typically involved in are of various technology industries. Per Pakes and Griliches (1984), on average, inventions through technology are converted into patent applications within two to three years. This study is about the effect of M&As made from 2005 to 2015, with the total number of M&A transactions being 205. These M&As comprise 78 organizations from the technology industry, covering and representing most of the technology market globally.

Economic Value Added (EVA)

Economic value added or EVA, as discussed before, is an essential performance measure for the value of the resultant organization. The value-added economic Model (EVA) is defined as the concept of financial profitability by Palliam (2006). EVA is both a measure of value and performance. This study used EVA, which is the difference between the revenue generated by the return on equity and the acquired organization's ownership cost. EVA adopts the same form as residual income and can be expressed as follows:$Economic\ Value\ Added\ (EVA) = (NOPAT) - WACC * K_e$ (5)

$Where,$

$EVA = Economic\ Value\ Added$

$NOPAT = Net\ operating\ profits\ after\ tax$

$WACC = Weighted\ Average\ Cost\ of\ Capital$

$K_e = Capital\ Invested = Equity + long\ term\ debt\ at\ the\ beginning\ of\ the\ period$

Ke is estimated using the standard Capital asset pricing model:

$$Ke = R_f + \beta i * (R_m - R_f) \quad (6)$$

$Where$

$Ke = Cost\ of\ Equity$

$Rf = Risk\ Free\ Rate\ of\ Return$

$Rm = Rate\ of\ Return\ on\ Market\ Index$

$\beta i = Beta\ coefficient$

The financial and economic data is obtained from Investment websites of the indices of the respective countries. R_m (the market rate of return) was assumed to be 15%, and R_f (the risk-free rate of return) has been considered as 7% based on the analysis period of 2005 to 2015. Beta values are determined from the Orbis along with the other details of the data. The rate of EVA for an organization is considered to account for the organization's size to normalize the value-added parameters with different sizes of organizations. The industry-adjusted measures are calculated using the arithmetic average financial ratio from the organization's sample.

Variables

The primary variable, as discussed before being estimated, is EVA. Healy et al. (1992) proposed that the financial ratios are not collected directly but are derived from the data and normalized against the revenue numbers. Based on the literature related to the EVA by Kumar & Bansal (2008) and Saboo et al. (2009), the following ratios were used to create the logistic regression model for estimating the EVA, as defined in Table 5. Traditional accounting measures have been criticized as unsatisfactory performance measures and deficient in shareholder wealth maximization. Performance measures relating to profitability ignore the cost of capital, which is essential for determining shareholder value creation. Sometimes, in

certain situations, even if an organization gets positive net income and a higher accounting rate of return, there might be a decline in shareholder wealth. Earnings might be lesser than the required return rate that shareholders could have earned by investing in other investment opportunities of similar risk.

Economic Value Added (EVA) is considered a better performance metric despite the limitations of old performance measures. EVA is the difference between the profit earned by the organization and the cost of capital. Leepsa and Mishra (2016) studied the acquirers' performance in the manufacturing sector by analyzing the EVA in different industries of India's manufacturing sector. The author mentioned that most companies had negative EVA, implying that they could not earn more than the capital cost than the amount of capital added. In contemporary economics and finance literature, EVA is essential in business performance measurement. EVA is a performance measure, the difference between the organization's operating profits and the cost of all the capital employed to earn that operating profit (Leepsa et al., 2016). EVA increases in three cases: if the same amount of capital is invested, the operating profits of the organization increase. Secondly, the new capital is invested, and the project must earn more than the old. Thirdly, new capital is invested, but capital is separate from business to other profitable opportunities. If the EVA is positive, the acquiring organization has added value to the target organization. If the EVA is negative, then the value is destroyed. It is an accurate performance metric to appraise company performance.

Table 1: Definition of economic and financial variables

Variable	Definition	Type Of Variable	Data Source
Economic value added (EVA)	EVA is defined as the organization's operating profits that are less than the cost of capital employed to reach that operating profit.	Dependent	Calculated by using secondary data as obtained from Orbis, IMAA
M&A Experience (MNAEXP)	Acquirers with prior experience will likely create value for shareholders, whereas inexperienced acquirers will likely destroy value. The experience was a dummy variable with a value of 1 representing the prior M&A experience of the acquirer and 0 otherwise. Mittal et al. (2017).	Independent	Calculated by using secondary data as obtained from Orbis, IMAA
Acquirer size (AQSIZE)	The acquirer's size for logistic regression is the log of total assets before one year of M&A. AQSIZE is one of the characteristics of the merging firm that affects firm value. Mittal et al. (2017).	Independent	Calculated by using secondary data as obtained from Orbis, IMAA
Current ratio (C.R.)	Current Assets/ Current Liabilities. The current ratio is a financial ratio used to test a company's liquidity by deriving the proportion of current assets available to cover current liabilities (Anwar & Debby, 2017).	Independent	Calculated by using secondary data as obtained from Orbis, IMAA
Quick ratio (Q.R.)	Quick Assets/ Current Liabilities. The quick ratio is an indicator of a company's short-term liquidity. (Anwar & Debby, 2017).	Independent	Calculated by using secondary data as obtained from Orbis, IMAA
Return on capital employed (ROCE)	Return on capital employed (ROCE) is the profit Before Interest and Tax/Average Capital applied. It is a ratio that measures a company's profitability and the efficiency with which its capital is employed. The return on capital employed measures firms' post-acquisition performance, where acquirers with higher pre-acquisition net returns on capital employed have superior long-run operating and stock performance compared to acquirers with lower returns (Qian & Zhu, 2017).	Independent	Calculated by using secondary data as obtained from Orbis, IMAA
Return on Assets (ROA)	Profit after Tax/ Total Assets. Return on assets (ROA) indicates how profitable a company is relative to its total assets. ROA shows how efficiently management uses its assets to generate earnings. Calculated by dividing a company's annual earnings by its total assets, ROA is displayed as a percentage. ROA is essential in evaluating firms' financial performance (Gandhi et al., 2017).	Independent	Calculated by using secondary data as obtained from Orbis, IMAA
Net Profit Margin (NPM)	Profit after Tax /Sales. The net profit margin is the percentage of revenue left after all expenses have been deducted from sales. The measurement reveals the profit a business can extract from its total sales. (Bos et al., 2017).	Independent	Calculated by using secondary data as obtained from Orbis, IMAA
Interest Coverage Ratio (ICR)	Interest/Profit Before Interest and Tax. This ratio is significant because it reflects an organization's ability to	Independent	Calculated by using secondary data as obtained

	meet its financial obligations and liabilities. In general, a higher coverage ratio denotes a more extraordinary ability of the organization to meet its creditors' obligations, while a lower coverage ratio means lesser ability. The coverage ratio is higher before than after the merger (Pina et al., 2017).		from Orbis, IMAA
Asset Turnover Ratio (ATR)	Sales/ Average Total Assets. The total asset turnover ratio measures the ability of a company to use its assets to generate sales efficiently. A company with a high total asset turnover ratio is considered efficient in making money using its assets. The ratio considers all assets, and it is one of the essential factors that impact the operational efficiency of production firms (Gill et al.,2017).	Independent	Calculated by using secondary data as obtained from Orbis, IMAA

Source: Own estimates

Logistic regression extends the multiple regression analysis techniques and works on the same principle as linear regression. In linear regression, the dependent variable or the outcome variable is continuous, while in logistic regression, the outcome variable is binary or dichotomous. It estimates the coefficients through a probabilistic method based on maximum likelihood. Logistic regression provides the conditional probability of an observation belonging to a particular class, given the observation's independent variables. It is based on a cumulative probability function and does not require the covariates' multivariate normality (Yuzbasioglu, 2002). Logistic regression has been used to determine the probability of the technology companies' success or failure after mergers and acquisitions. Logistic regression is carried out based on the occurrence or non-occurrence of firms' events (success or failure of M&A). To define the successful or unsuccessful/failed firms after M&A, EVA was used to segregate the sample firms into successful and unsuccessful M&A deals. The different traditional financial parameters used for the study and the definitions of variables are listed in Table 2.

Table 2: Financial Parameters variables and definition

Financial Parameters	Variables	Definitions
Liquidity	Current Ratio (CR)	Current Assets/ Current Liabilities
	Quick Ratio (Q.R.)	Quick Assets/ Current Liabilities
Profitability	Return on capital employed (ROCE)	Profit Before Interest and Tax/Average Capital Employed
	Return on Assets (ROA)	Profit after Tax/ Total Assets
	Net Profit Margin (NPM)	Profit after Tax /Sales
Leverage	Interest Coverage Ratio (ICR)	Interest/Profit Before Interest and Tax
Efficiency	Asset Turnover Ratio (ATR)	Sales/ Average Total Assets

Source: Collected from various existing literature.

Leepsa and Mishra (2012) found that merged firms show significant operating performance improvements, while Ramaswamy and Waegelein (2003) found improved post-merger operating financial performance measured by industry-adjusted return on assets. Also, most of the merged companies had improved their financial performance. Vanitha and Selvam (2011) agreed that the financial performance of merged companies improves. Ooghe et al. (2006) found that combined companies' profitability, liquidity, and solvency/leverage declines. To support this, a study by Pazarskis et al. (2006) also found that the profitability of merged firms decreases due to merger and acquisition activity. Kumar (2009) stated that, on average, the acquiring companies' post-merger profitability, assets turnover, and solvency/leverage ratios show no improvement to pre-merger values. Mantravadi and Reddy (2008) found that mergers positively impact firms' profitability in the banking and finance industry, while the pharmaceuticals, textiles, and electrical equipment sectors saw a marginal reduction in performance in terms of profitability and returns on investment.

Positive coefficient values indicate that an increase in the variable raises the likelihood of success of M&A, and of course, a negative sign reduces the likelihood. In the current study, Logistic regression has been used to analyze the probability of technology organizations' success after M&A. Two levels of categorization have been made here: successful and

unsuccessful mergers. Various economic and financial conditions scenarios determine the M&As in these two categories, regardless of the reasons for success or failure.

The Logit Model is:

$$l_i = log \frac{p_i}{(1-p_i)} = (\beta_0 + \beta_1 * profitability + \beta_2 * liquidity + \beta_3 * leverage + \beta_4 * efficiency + \beta_5 * AQSIZE_i + \beta_6 * MNAEXP_i + \varepsilon_i) \quad (8)$$

$$Dependent\ Variable = Binary\ (p_i)\ \&\ (1-p_i)$$

$$l_i = Logit\ variable$$

The dependent variables are:

p_iIs the probability that organizations become successful after M&A, with success being

$$Post\ M\&A * \frac{EVA}{Net\ Worth} > PreM\&A * \frac{EVA}{Net\ Worth} \quad (9)$$

Or

$1 - p_i$Is the probability that organizations failed after M&A, failure being

$$Post\ M\&A * \frac{EVA}{Net\ Worth} < PreM\&A * \frac{EVA}{Net\ Worth} \quad (10)$$

A proper specification of the dependent variable (success or failure) needs to be incorporated. Independent variables must consider all available information concerning the firm's performance before the deal, making it successful or unsuccessful. Hence, the EVA rate, an accurate measure of profit per Hagedoorn(2002), is considered a criterion for deciding whether to be successful or unsuccessful. The independent variable takes financial ratios before M&A and other factors like size and experience before the deal. The independent variables were:

MNAEXP = M&A Experience, Dummy values 1 and 0 for the experience or no experience.
AQSIZE = Size of Acquirer, in USD Billions
ICR = PreM&A interest coverage ratio (no units)
ATR = PreM&A asset turnover ratio (no units)
CR = PreM&A current ratio (no units)
QR = PreM&A quick ratio (no units)
ROA = PreM&A return on assets (no units)
ROCE = PreM&A return on capital employed (no units)
NPM = PreM&A net profit margin (no units)
ε = error term

The independent and control variables' summary statistics to estimate the EVA rate were determined, as shown in Table 7. The sample is divided into two parts: The successful M&As and the failed M&As. Some more extended calculations and estimations were done to arrive at analytical conclusions.

Table 1: Summary Statistics of Independent Variables using the rate of EVA

Descriptive Statistics	Successful Companies		Failure Companies	
	Mean	Std. Deviation	Mean	Std. Deviation
MNAEXP	0.51	0.47	0.68	0.43
AQSIZE	5.42	1.65	5.36	1.84
CR	-0.11	0.38	-0.23	0.34
QR	-0.02	0.29	-0.07	0.31
ROA	0.04	0.31	0.07	0.27
ROSE	0.04	0.37	0.02	0.31
NPM	0.02	0.27	0.03	0.22
ATR	0.04	0.35	-0.07	0.39
ICR	0.02	0.29	0.02	0.22

Source: Secondary data collection from the IMAA and Orbis databases

Financial Ratios

Financial ratios describe the financial summary of the acquiring organizations and the target organizations' impact on the overall economic value of the combined organization(Ramakrishnan, 2008). The ratios are normalized for the organizations' size because the organizations' sample consists of acquiring and targets from sub-sectors in the technology area. Normalization implies that the financial ratios are not collected directly but are normalized against the revenue numbers. The volumes and sizes of these organizations differ significantly. The panel data span an extended period of 11 years, and the technology industry has developed during the mentioned period.

The size of the technology industry has also grown. Leepsa et al. (2012) found the trend related to the M&A financial ratios pre- and post-times. It compares the post-merger performance related to pre-merger profitability, liquidity, and solvency. In their empirical study, Mantravadi et al. (2008) provided the hypothesis about M&A on the profitability, liquidity, leverage, and efficiency as the four major areas to measure the overall performance of the organizations. As the literature and theory describe specific trends for the economic value, it suggests the following seven hypotheses for the various parameters:

H1: The profitability standards regarding return on assets (ROA) post-M&A impact the success and failure of M&A in the technology industry.

H2: The profitability standards regarding return on capital employed (ROCE) post-M&A impact the success and failure of M&A in the technology industry.

H3: The profitability standards regarding net profit margin (NPM) post-M&A impact the success and failure of M&A in the technology industry.

H4: The leverage standards impact the interest coverage ratio (ICR) post-M&A and the success and failure of M&A in the technology industry.

H5: The liquidity standards have an impact on the current ratio (C.R.) post-M&A on the success and failure of M&A in the technology industry.

H6: The liquidity standards impact the quick ratio (Q.R.) post-M&A and the success and failure of M&A in the technology industry.

H7: Efficiency standards impact the asset turnover ratio (ATR) post-M&A, affecting the success or failure of M&A in the technology industry.

Empirical Analysis

Table 8 shows the Correlation Matrix for the variables, showing some correlations among the variables. However, the variables show minimal correlation amongst themselves, and correlation is significant at 5% and 1 %. There has been no pair of correlation coefficients among the independent variables in the model greater than 0.8. Thus, multicollinearity would be less likely to occur.

Table 2: Correlation Analysis and Pearson correlation coefficients

Correlation	1	2	3	4	5	6	7	8	9
M&A experience (MNAEXP)	1.000								
Acquirer size (AQSIZE)	0.658	1.000							
Current ratio (CR)	0.517	0.463	1.000						
Quick ratio (QR)	0.409	0.401	0.353	1.000					

Return on asset (ROA)	0.433	0.436	0.357	0.597	1.000				
Return on capital employed (ROCE)	0.378	0.362	0.336	0.531	0.542	1.000			
Net profit margin (NPM)	0.106	0.125	0.114	0.213	0.191	0.221	1.000		
Asset turnover ratio (ATR)	0.511	0.457	0.459	0.583	0.653	0.508	0.372	1.000	
Interest coverage ratio (ICR)	0.456	0.523	0.342	0.365	0.264	0.386	0.382	0.358	1.000

Correlation is significant at the 0.05 level (2-tailed).

Source: Secondary data collection from the IMAA and Orbis databases

The results of logistic regression by EVA for technology acquisition are shown in Table 11. The odds ratio and coefficients are listed in the table. The odds ratio is calculated as the probability of success to failure due to a given variable. The higher odds ratio value implies more positive impacts of the variables on the post-M&A success. A threshold of 0.50 is considered as the success and failure probability. The likelihood ratio test is performed as an indicator to explain and justify the variability of the model. The likelihood ratio test results are shown below.

Table 3: Logit Estimates using the rate of EVA as Dependent Variable

Independent Variables	Coefficient (β)	Odd RatioExp(β)
Constant	-0.056 (-0.154)	0.87
MNAEXP	-0.31 (-1.09)	0.65
AQSIZE	0.04 (0.68)	1.12
CR	-2.51 (-3.98***)	0.06
QR	3.07 (4.089***)	19.64
ROA	0.81 (0.91)	2.087
ROCE	-0.009 (-0.03)	1.011
NPM	-1.52 (-1.58*)	0.27
ATR	0.82 (2.49**)	1.98
ICR	0.23 (0.29)	1.88
Number of Observations	174	
Likelihood ratio test : Chi-square(9)	28.6733 (0.0001)	
Mean dependent variable	0.47	
SD. Dependent variable	0.29	
McFadden R-squared	0.06	
Log-likelihood	- 63.94	
Z score	Less than 0.02-Failure 0.02 and Above-Success	

***, * * and, * represent statistical significance at the 1 %, 5 % and 10 % levels respectively. The figure in the bracket represents the z statistics values.

Source: Secondary data collection from the IMAA and Orbis databases

The dependent variable (DV) is binary, with a value of one if the M&A is successful and 0 if it is not. p_i is the probability that an M&A transaction is successful after M&A and $(1 - p_i)$ is the probability that an M&A transaction fails after the M&A. The likelihood ratio test shows the explanatory power of the model. Here, the likelihood ratio test is 0.0001 for M&A. Also, standard errors were controlled for robustness using the HC1 method to control the assumed heteroscedasticity in the data. It indicates that the logistic model better explains a firm's success for M&A probability.
In terms of financial ratios and their relationship with the EVA rate, the results are being tested against the hypothesis. The estimated coefficient of the current ratio (liquidity) is -2.51($p<0.01$), and the estimated coefficient of the net profit margin (profitability) is -1.52 ($p<0.1$). The coefficients of the two parameters are negative and statistically significant. The estimated coefficient of quick ratio (liquidity) is 3.07 ($p<0.01$), and the estimated coefficient of asset turnover ratio (efficiency) is 0.82 ($p<0.05$). The coefficients of the two parameters are negative and statistically significant. M&A experience, size of the acquirer, the organization's profitability, and solvency variables like return on assets, return on capital employed, and interest coverage ratio have emerged as insignificant variables in explaining M&A activity in the technology sector. Thus, the following hypotheses could be tested based on these results and estimates. Table 4.13 shows the hypothesis tests against the regression results.

Table Error! No text of specified style in document.**.13: Hypotheses Tests for the M&A activities against the financial parameters**

Hypotheses for financial parameters	Parameters estimated	Significant/ Coefficient Sign	Hypothesis Test
H1: The profitability standards regarding return on assets (ROA) post-M&A impact the success and failure of M&A in the technology industry.	Return on Assets (ROA)	No	H1 can be rejected
H2: The profitability standards regarding return on capital employed (ROCE) post-M&A impact the success and failure of M&A in the technology industry.	Return on capital employed (ROCE)	No	H2 can be rejected
H3: The profitability standards regarding net profit margin (NPM) post-M&A have an impact on the success and failure of M&A in the technology industry.	Net Profit Margin (NPM)	Yes, negative	H3 cannot be rejected
H4: The leverage standards regarding the interest coverage ratio (ICR) post-M&A impact the success and failure of M&A in the technology industry.	Interest Coverage Ratio (ICR)	No	H4 can be rejected
H5: The liquidity standards impact the current ratio (C.R.) post-M&A, affecting the success or failure of M&A in the technology industry.	Current Ratio (C.R.)	Yes, negative	H5 cannot be rejected.
H6: The liquidity standards impact the quick ratio (Q.R.) post-M&A and the success and failure of M&A in the technology industry.	Quick Ratio (Q.R.)	Yes, positive	H6 cannot be rejected
H7: Efficiency standards have an impact on the asset turnover ratio (ATR) post-M&A, affecting the success and failure of M&A in the technology industry.	Asset Turnover Ratio (ATR)	Yes, positive	H7 cannot be rejected

Source: own estimates

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Robustness Tests: Logistic Regression

There are several methods for testing the robustness of the results. The most common technique is applying multiple criteria to test the model's quality on various regression models against the used logistic regression and the robust standard error. The criterion used for testing the robustness of the model is as follows. The Akaike information criterion (AIC) estimates in-sample prediction error and the relative quality of statistical models for a given data set. The Schwarz Criterion (S.C.) is a measure that helps select candidate models.

The criterion considers the points' closeness of fit to the model and the number of parameters used. The Hannan-Quinn information criterion (HQC) is another measure of a statistical model's goodness of fit. It is often used as a criterion for model selection among models.

Table 4: Robustness Tests for the alternative specifications against the financial parameters

	Mergers	Acquisitions	Excluding Leverage	Excluding Liquidity	2005-2009	2010-2016
	(1)	(2)	(3)	(4)	(5)	(6)
MNAEXP	-0.21	-0.012	-0.38	-0.38	-0.26	-0.43
	(0.53)	(-2.17**)	(-0.76)	(-0.654)	(-0.464)	(-0.376)
AQSIZE	0.021	0.017	0.042	0.046	0.047	0.054
	(-1.50)	(3.87***)	(1.79)	(0.876)	(1.827)	(1.739)
CR	0.03	0.17	0.04	-	0.04	0.04
	(0.36)	(0.87)	(0.68)		(0.68)	(0.68)
QR	2.34	3.73	2.454	-	2.786	2.345
	(3.56***)	(3.52***)	(-3.98***)		(-3.65***)	(-3.76***)
ROA	3.36	5.18	0.82	0.84	0.782	0.636
	(1.75)	(0.97)	(0.63)	(0.673)	(0.767)	(0.769)
ROCE	0.28	2.72	0.81	0.81	0.81	0.81
	(0.29)	(1.45)	(0.91)	(0.91)	(0.91)	(0.91)
NPM	0.51	-2.32	-0.009	-0.009	-0.009	-0.009
	(0.84)	(-1.69*)	(-0.03)	(-0.03)	(-0.03)	(-0.03)
ATR	1.63	1.75	0.86	0.87	0.82	0.82
	(2.74**)	(2.64**)	(2.32**)	(2.17**)	(2.33**)	(2.47**)
ICR	0.64	0.89	-	0.23	0.39	0.71
	(0.63)	(0.73)		(0.22)	(0.57)	(0.99)
Number of Observations	123	51	174	174	101	73
Akaike information criterion (AIC)	103.44	140.54	175.63	181.52	179.79	132.65
Schwarz Criterion (SC)	143.80	172.19	139.88	174.22	187.55	121.88
Hannan-Quinn criterion (HQC)	119.61	150.30	132.60	146.48	160.09	133.59

***, * * and, * represent statistical significance at the 1 %, 5 % and 10 % levels respectively. The figure in the bracket represents the z statistics values.

Source: Secondary data collection from the IMAA and Orbis databases

Logistic regressions are performed with alternative specifications or different sample groups. The result is presented in Table 12. First, to eliminate the effect of mergers and acquisitions in one data set, the two sub-models for mergers and acquisitions from the overall 174 transactions are used as Model 1 and Model 2. The results in the two models are in line with the regular model, with only a difference in the logistic regression results for acquisition data, and both the M&A

experience parameter (MNAEXP) and the acquirer size(AQSIZE) are found to be significant. It could be explained that the acquisition scenarios are prominent when the acquirer's size and experience are greater (Moeller, 2003). Secondly, the multicollinearity between the bidding firm's liquidity and leverage ratio can bias the estimates. Thus, the regressions of Model 3 and Model 4 in Table 12 exclude leverage or liquidity from the independent variables. Overall, results do not change when either leverage or liquidity parameters are eliminated.

Thirdly, The financial crisis has dramatically changed the landscape for takeover bids, especially in the U.S. market. To capture the financial crisis effect, we divide the entire sample into two sub-samples, 2005-2009 (period of the financial crisis) and 2010-2016 (recovery period) and Model 5 and Model 6. No evidence confirms the explanatory variables' relationship with M&A success in 2010-2016, as per Model 6. To summarize, the findings in Table 12 are robust to reduced samples, selected variables, and periods.

Conclusion

A few conclusions were drawn from the logistic regression and its predictive accuracy regarding economic value. The financial ratios helped identify the characteristics of successful and unsuccessful firms after post-merger and acquisition performance. The prediction model is consistent with past findings from the literature (Sorensen, 2000). Few other conclusions were drawn from the logistic regression about the parameters used in the logistic regression.

The results received by the logistic regression analysis show that the acquirer size and prior M&A experience are insignificant. Thus, these two determinants do not predict whether an M&A will be successful or not. Regarding the relationship, they do not relate to the post-M&A rate of EVA. The net profit margin significantly classified the transaction into successful or unsuccessful after M&A. The probability of an M&A transaction's success increases with the current ratio and net profit margin and decreases as the quick and asset turnover ratios increase. The lower current ratio and profitability increase the probability of a given firm's success after M&A, whereas the probability of M&A success increases with an increase in the quick ratio and efficiency. It is in line with the overall volatile and dynamic characteristics of technology organizations to be successful or unsuccessful after M&A. Prior M&A experience, return on capital employed, interest coverage ratio, and acquirer size do not impact the firm's probability of success after M&A. The organizations could be successful or unsuccessful after M&A. The current study predicts the post-M&A success of technology organizations. The study has identified and justified the financial parameters and their respective weights in the success and failure of M&A transactions. EVAs show an accurate picture of the organizations' performance. An increase in the EVA rate in the post-M&A period compared to the pre-M&A period was considered successful or unsuccessful. The logistic regression results using the rate of EVA parameter found that the number of correctly predicted cases was 64 out of 78 for M&A. At the cut-off value of 0.50, the model correctly predicted 44 failure cases out of 51 while 20 success cases out of 27. The probability of a given firm's success after M&A increased as the pre-M&A current ratio and net profit margin decreased, while its pre-M&A quick ratio and asset turnover ratio increased. It was estimated that a Z score of below 0.02 in the case of M&A would indicate the company was probably headed for failure. On the other hand, the companies with scores above 0.02 were likely to be successful. Of the various factors considered, the quick ratio was the most significant predictor of M&A success. Thus, managers should give more importance to a company's liquidity position.

The study's purpose was to develop a model showing the financial determinants of M&As in the technology industry to estimate their technological and economic value. In combination, the models cover the significant aspect of the economic value of M&As in the technology industry.

Limitations

Due to time and resource limitations, the study has focused on organizations only in the specific technology sector. The other cross-functional sectors which use the technology have not been considered in the study here. This study limits its scope to a few independent variables used in the logit model, which may not be adequate to predict M&A success from an economic value perspective. Future studies can be made, taking into account more factors. As the results might reflect the technology industry and tenure factors, elaborating the study in different settings could provide valuable newer insights related to the technology M&As' success and failures.

References

1. Anand, J., & Kogut, B. (1997). Technological capabilities of countries, organization rivalry, and foreign direct

investment. Journal of International Business Studies. https://doi.org/10.1057/palgrave.jibs.8490107
2. Aw, M. S. B., & Chatterjee, R. A. (2004). The performance of U.K. organizations acquiring large cross-border and domestic takeover targets. Applied Financial Economics. https://doi.org/10.1080/0960310042000211605
3. Azofra, S. S., Díaz, B. D., & Gutiérrez, C. L. (2007). Corporate takeovers in Europe: do bidders overpay? 7th Global Conference on Business & Economics.
4. Banerjee, P., Banerjee, P., De, S., Jindra, J., & Mukhopadhyay, J. (2014). Acquisition pricing in India during 1995-2011: Have Indian acquirers beaten the odds? Journal of Banking and Finance. https://doi.org/10.1016/j.jbankfin.2013.09.011
5. Dang, U. (2011). The CAMEL Rating System in Banking Supervision: A Case Study of Arcada University of Applied Sciences. International Business.
6. DePamphilis, D. (2012). Mergers, Acquisitions, and Other Restructuring Activities. In Mergers, Acquisitions, and Other Restructuring Activities. https://doi.org/10.1016/C2010-0-67115-X
7. DePamphilis, D. M. (2014). Mergers, acquisitions, and other restructuring activities: Seventh edition. In Mergers, Acquisitions, and Other Restructuring Activities: Seventh Edition. https://doi.org/10.1016/C2010-0-67764-9
8. Díaz, K. B. D., Azofra, S. S., & Gutiérrez, C. L. (2009). Are M&A Premiums Too High? Analysis of Quadratic Relationship between Premiums and Returns. Quarterly Journal of Finance and Accounting.
9. Faulkner, D., Teerikangas, S., & Joseph, R. J. (2012). The Handbook of Mergers and Acquisitions. In The Handbook of Mergers and Acquisitions. https://doi.org/10.1093/acprof:oso/9780199601462.001.0001
10. Freeman, C., & Hagedoorn, J. (1994). Catching up or falling behind: Patterns in international inter-organization technology partnering. World Development. https://doi.org/10.1016/0305-750X(94)90049-3
11. Gerpott, T. J. (1995). Successful integration of R&D functions after acquisitions: An exploratory empirical study. R&D Management. https://doi.org/10.1111/j.1467-9310.1995.tb00909.x
12. Griliches, Z. (1990). Patent Statistics as Economic Indicators: A Survey. In Journal of Economic Literature. https://doi.org/10.1016/S0169-7218(10)02009-5
13. Hagedoorn, J., & Duysters, G. (2002). The effect of mergers and acquisitions on the technological performance of companies in a high-tech environment. Technology Analysis and Strategic Management. https://doi.org/10.1080/09537320220125892
14. Hagedoorn, J., & Duysters, G. (2002). External sources of innovative capabilities: The preference for strategic alliances or mergers and acquisitions. Journal of Management Studies. https://doi.org/10.1111/1467-6486.00287
15. Haleblian, J., & Finkelstein, S. (1999). The influence of organizational acquisition experience on acquisition performance: A behavioral learning perspective. Administrative Science Quarterly. https://doi.org/10.2307/2667030
16. Hall, B. H., Berndt, E., & Levin, R. C. (1990). The Impact of Corporate Restructuring on Industrial Research and Development. Brookings Papers on Economic Activity. Microeconomics. https://doi.org/10.2307/2534781
17. Harrison, J. S., Hitt, M. A., Hoskisson, R. E., & Ireland, R. D. (2001). Resource complementarity in business combinations: Extending the logic to organizational alliances. Journal of Management. https://doi.org/10.1016/S0149-2063(01)00118-0
18. Haspeslagh, P. C., & Jemison, D. B. (1991). The challenge of renewal through acquisitions. Planning Review. https://doi.org/10.1108/eb054320
19. Healy, P. M., Palepu, K. G., & Ruback, R. S. (1992). Does corporate performance improve after mergers? Journal of Financial Economics. https://doi.org/10.1016/0304-405X(92)90002-F
20. Hitt, M. A., Hoskisson, R. E., Johnson, R. A., & Moesel, D. D. (1996). The market for corporate control and organization innovation. In Academy of Management Journal. https://doi.org/10.2307/256993
21. Hubbard, N., & Hubbard, N. (1999). Why History Repeats Itself: Acquisition Trends, Successes, and Failures. In Acquisition. https://doi.org/10.1007/978-1-349-14870-7_2
22. Jemison, D. B., & Sitkin, S. B. (1986). Corporate Acquisitions: A Process Perspective. Academy of Management Review. https://doi.org/10.5465/amr.1986.4282648
23. Kish, R., & Vasconcellos, G. (1993). An Empirical Analysis of Factors Affecting Cross-Border Acquisitions: U.S.-Japan. Management International Review.
24. Kitching, J. (1967). Why do mergers miscarry? Harvard Business Review.
25. Kumar, S., & Bansal, L. K. (2008). The impact of mergers and acquisitions on corporate performance in India. Management Decision. https://doi.org/10.1108/00251740810920029

26. Leepsa, N. M., & Mishra, C. S. (2012). Post-merger financial performance: A study concerning select manufacturing companies in India. International Research Journal of Finance and Economics.
27. Mantravadi, P., & Reddy, V. (2007). Relative Size in Mergers and Operating Performance : Indian Experience. Economic and Political Weekly.
28. Mantravadi, P., & Reddy, A. V. (2008). Post-Merger Performance of Acquiring Organizations from Different Industries in India. International Research Journal of Finance and Economics.
29. Nagaoka, S., Motohashi, K., & Goto, A. (2010). Patent statistics as an innovation indicator. In Handbook of the Economics of Innovation. https://doi.org/10.1016/S0169-7218(10)02009-5
30. Palich, L. E., Cardinal, L. B., & Miller, C. C. (2000). Curvilinearity in the diversification-performance linkage: An examination of over three decades of research. Strategic Management Journal. https://doi.org/10.1002/(SICI)1097-0266(200002)21:2<155::AID- SMJ82>3.0.CO;2-2
31. Palliam, R. (2006). Further evidence on the information content of economic value-added. Review of Accounting and Finance. https://doi.org/10.1108/14757700610686417
32. Ramakrishnan, K. (2008). Long-term post-merger performance of organizations in India. In Vikalpa. https://doi.org/10.1177/0256090920080204
33. Roll, R. (1986). The Hubris Hypothesis of Corporate Takeovers. The Journal of Business. https://doi.org/10.1086/296325
34. Rosenzweig, P. M., Haspeslagh, P. C., & Jemison, D. B. (1993). Managing Acquisitions: Creating Value through Corporate Renewal. The Academy of Management Review. https://doi.org/10.2307/258765
35. Scott, J. T. (1989). Purposive diversification as a motive for the merger. International Journal of Industrial Organization. https://doi.org/10.1016/0167-7187(89)90045-3
36. Stellner, F. (2015). The Impact of Technological Distance on M&A Target Choice and Transaction Value. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2656088
37. Vasconcellos, G. M., & Kish, R. J. (1998). Cross-border mergers and acquisitions: The European-US experience. Journal of Multinational Financial Management. https://doi.org/10.1016/s1042-444x(98)00041-3
38. Vasconcellos, G. M., & Kish, R. J. (1996). Factors affecting cross-border mergers and acquisitions: The Canada-U.S. experience. Global Finance Journal. https://doi.org/10.1016/S1044-0283(96)90006-X
39. Zollo, M., & Singh, H. (2004). Deliberate learning in corporate acquisitions: Post-acquisition strategies and integration capability in U.S. bank mergers. In Strategic Management Journal. https://doi.org/10.1002/smj.426