

# **The Role of M&A in Market Convergence: Amazon, Apple, Google and Microsoft**

Ahreum Hong\*, Debadutta Bhattacharyya\*\* and George T. Geis\*\*\*

*In this paper, we analyze the M&A activity of Amazon, Apple, Google and Microsoft from 2003-2011 and classify their acquisitions according to a “Media-Internet-Technology” (“MIT”) scheme. This distinctive classification method is designed to capture recent market trends within the Media and Information Technology sectors. The need for constant innovation in post-PC offerings brought about by the rapid uptake of mobile and cloud technology has prompted these companies to use M&A as a vehicle to expand their product portfolios and position themselves better to cater to a converging MIT universe. Our paper analyzes the impact of M&A activity on revenues for each company at a segment level and confirms the presence of a statistically significant positive relationship between the two variables. A reciprocal analysis at a broader group level for the leading US-based technology companies shows no statistical significance between overall revenue CAGR and M&A activity over the same time period.*

**JEI Code: M10, O19**

## **1. Introduction**

Acquisitions have played dramatically different roles in the corporate business development policies of leading companies such as Apple and Google. In order to understand the drivers and impact of M&A transactions at a segment level, we have classified acquisitions carried out by a representative group of companies according to a distinctive “Media-Internet-Technology” (“MIT”) classification scheme. This classification scheme is aimed at capturing the recent trends in the Media and Information Technology sectors which have evolved significantly over the last decade with a progressive shift towards areas such as mobile and cloud offerings. In order to respond to these changing dynamics, companies have had to expand beyond their core focus areas and provide a more integrated set of offerings. This has led to a natural convergence of the Media, Internet and Technology sectors with significant overlap and interdependence existing among the different sub-sectors within each of these segments. Companies historically specializing in one of these sectors have therefore felt the need to diversify and move into these adjacent industries in an effort to offer a more complete set of products and services. While some of this has been brought about by enhanced focus on internal R&D, a major part of this expansion has been through

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inorganic growth propelled by a systematic M&A strategy. The paper specifically analyzes this shift as reflected in the corporate business development activities engaged in by Amazon, Apple, Google and Microsoft between 2005 and 2011.

As a part of the empirical analysis, we have studied the impact of segmental revenue growth on the number of M&A transactions executed by the four target companies. This has then been extended to a broader set of US IT companies and the impact of revenue growth on M&A policy has been statistically analyzed at a group level. Finally in order to further investigate the relationship between revenue and M&A, we have looked into the role of M&A as a key driver of segment revenue for Amazon, Apple, Google and Microsoft.

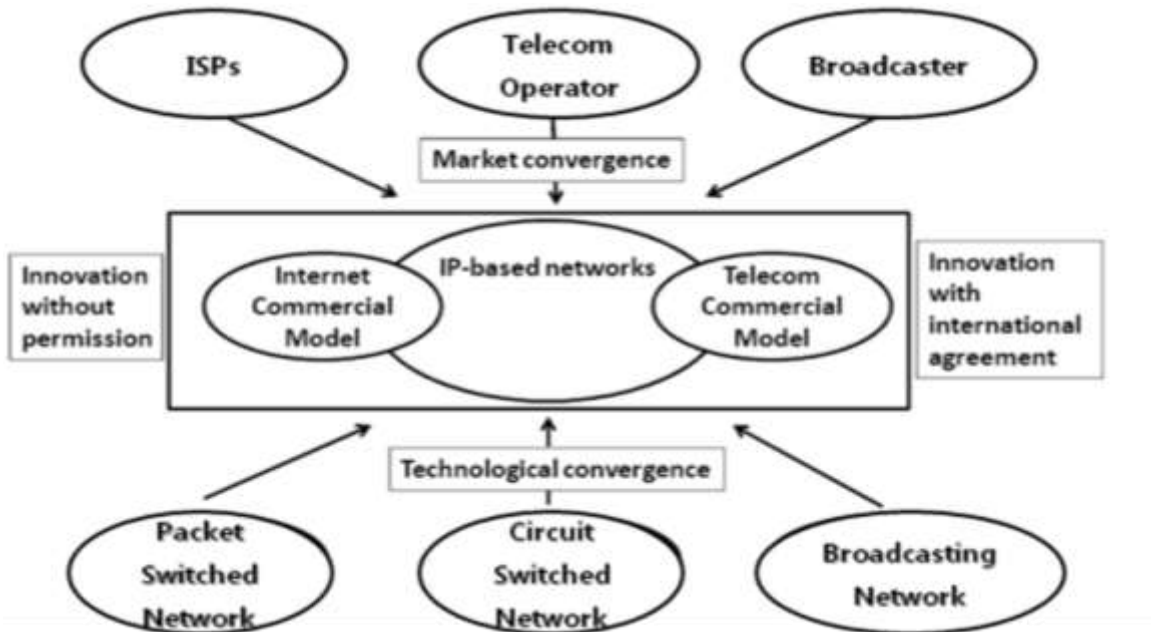
The paper is organized into five main sections, including “Literature Review” which looks at existing literature within the research area, “Data and Methodology” which provides an overview of the sample set and statistical methods used, “Illustration of M&A strategy” which analyzes some of the factors driving M&A strategies, and “Hypotheses and results” detailing the empirical analyses and underlying results. A summary of the key findings and future research areas has been provided in the final “Conclusion and limitation” section.

## **2. Literature Review**

### **2.1 Convergence**

Horrocks (2006) has analyzed the convergence trend that has come about in technology and in markets, and has suggested the criteria for success and the role of positioning within this dynamic process. With an increasing trend towards digitalization of data and a shift towards IP-based networks, the broadcasting and telecommunication sectors have witnessed significant convergence over the past few years. A report by OECD (2007) illustrated that the convergence of data and Next Generation Networks has made the Media, Information and Telecom markets more competitive with respect to the number of players and the services provided. According to the report, convergence can be defined across a number of levels such as network, services, device, industry/market and regulatory. At each level this affects the interactive media and broadcasting services, changing customer needs and driving the demand for greater content from network access operators.

Figure 1. Convergence Model



Source: J. Horrocks, "NGN and Convergence Models, Myths, and Muddle", OECD NGN Foresight Forum, 3 October 2006.

## 2.2 The Role of M&A – Efficiency, Synergy, Product Diversification

In the face of changing consumer demands as a result of this convergence, companies have resorted to both internal research and development, as well as to M&A, to move vertically along the value chain or expand horizontally. Yoffie (1997) demonstrated that with the coming of age of digital technology, leading IT companies have had to undergo managerial changes, especially in product and process management, towards more innovative approaches. In a similar vein, this paper tries to capture the importance of M&A and its role in bringing about product diversification, efficiency gain, and other associated synergies within the converging MIT ecosystem.

## 2.3 Key M&A Drivers

Depamphilis (2001) suggested a number of different factors that could affect the M&A strategy of companies. Operating synergies from economies of scale and economies of scope, strategic realignment and technology changes could be major motivating factors for carrying out M&A. The need to deliver new products brought about by technological innovations has often accelerated strategic acquisitions, not all of which have been successful. For example, eBay's acquisition of Skype was intended to boost trading on its online auction site through the use of internet phone technology, but did not live up to management expectations.

### 2.4 Impact of M&A Activity on Company Performance

We have also reviewed existing literatures that study the impact of M&A on the performance of the acquiring firm or the merged entity. Often this analysis looks at performance metrics before and after the transaction announcement date in order to make a comparative analysis. This paper however does not aim to focus on the immediate impact after the announcement but at a more fundamental level involving the factors affecting the rate of M&A and its association with revenue growth.

A number of references point to the negative impact that M&A strategies have sometimes had on the acquirer. Jope et al., (2009) showed through an event study analysis that M&A has resulted in negative shareholder returns in a number of cases. (However despite the fall in shareholder returns, the M&A strategy of the acquirer could in each case be justified by the need to reposition itself in the face of dynamic changes in the Technology, Media and Telecommunication industries.) Park et al., (2002) found that the high transaction costs involved in an M&A process sometimes outweighed the positive synergy effects resulting in an overall negative impact on market value. Rahaman (2008) showed that excessively acquisitive firms often demonstrated unstable market value and operating performance metrics owing to low liquidity levels and high levels of short-term debt arising from frequent M&A activities. According to Cheon (2003), within the Information Communication Technology (ICT) industry, post-M&A integration in case of a merger between a broadcasting and a telecommunication company becomes especially difficult owing to strong cultural differences and high system integration cost. Waterman (2000) analyzes the economic and social effect of the merger of CBS and Viacom which resulted in the second largest media conglomerate in USA. In this particular case, the media content and network quality of these companies were affected more by deregulation and policy making rather than by M&A itself.

There is also some support for the role that M&A can play in business diversification and the positive impact that it can have on the acquiring firm's valuation levels. Lins and Servaes (2002) in a study of 1,000 firms from emerging markets showed that diversified firms on average showed 7% higher valuation than single-segment firms. Arya (2012) found that for Indian companies, M&A played a crucial role in improving their core competencies and in enhancing their market value by as much as 28% between 2000 and 2007.

Therefore earlier studies in the field have mainly focused on the impact, positive or negative, that M&A strategies have had on firms' valuation and shareholder returns. This paper however aims to investigate the association between the number of transactions executed and revenue growth of the acquirer over a specific period of time. The analysis carried out both at a group level as well as at a segment level, also provides much more granular results compared to existing research in this field of study.

## 2.5 R&D vs. M&A Activity

The final point that this paper addresses is the effect of R&D expenditure on information technology and its impact on revenue growth vis-a-vis M&A. Bertrand and Zuniga (2006) analyzed the impact of M&A on R&D investments and found that M&A had a limited influence on aggregated R&D investments. They also found that domestic and cross-border M&A had different impacts on R&D activities. Historically the effect of R&D has been examined at an industry level and at a country level by the OECD. For our four target firms, Samuel (2010) conducted a detailed investigation by comparing the R&D efficiency which was defined as the “average cash flow generated during two years for one dollar invested in average during the two previous years”. It was noted that while Microsoft was the biggest investor in R&D, Apple replaced Google as the most efficient company in 2009.

## 3. Data and Methodology

The MIT classification scheme is a crucial component of our paper as it provides a distinctive viewpoint, while at the same time accounting for the recent trends and changing dynamics within the industry. Therefore before classifying the acquisitions of these companies according to the MIT scheme, we elaborate on the sub-segments that have been considered under each of these sectors for the purpose of classification.

**Media:** This segment includes all offerings that directly provide content, either through online sources or through more traditional means, such as publishing and cable or satellite broadcasting. With companies like Google and Apple making a foray into Internet TV and Amazon making available an increasing amount of content on its Kindle devices, a number of providers are now packaging their media content with other offerings and resorting to a large extent, on the Internet, to reach their end users. While some revenue in this segment is earned through directly selling content or from membership fees, for most of these companies a significant portion of the revenue is in fact generated from advertising. Therefore advertising companies are considered an integral part of the Media segment.

**Internet services and software:** As the name suggests, this includes offerings that are provided to end users only through the online channel. A broad segment, this encompasses a variety of web-based offerings from e-commerce to social networking, internet portals to more specific web analytics infrastructure, and from software supporting search engines to the rapidly growing universe of mobile applications. As the focus on mobile and cloud technologies have increased, this segment has become a crucial means to deliver growth in the Media industry and boost associated hardware and gadget sales.

**Technology platform:** This segment comprises all electronic consumer gadgets and related hardware as well as the underlying systems and application software necessary for the smooth and user-friendly functioning of these products. The increasing importance of hardware-software integration has prompted a number of traditional

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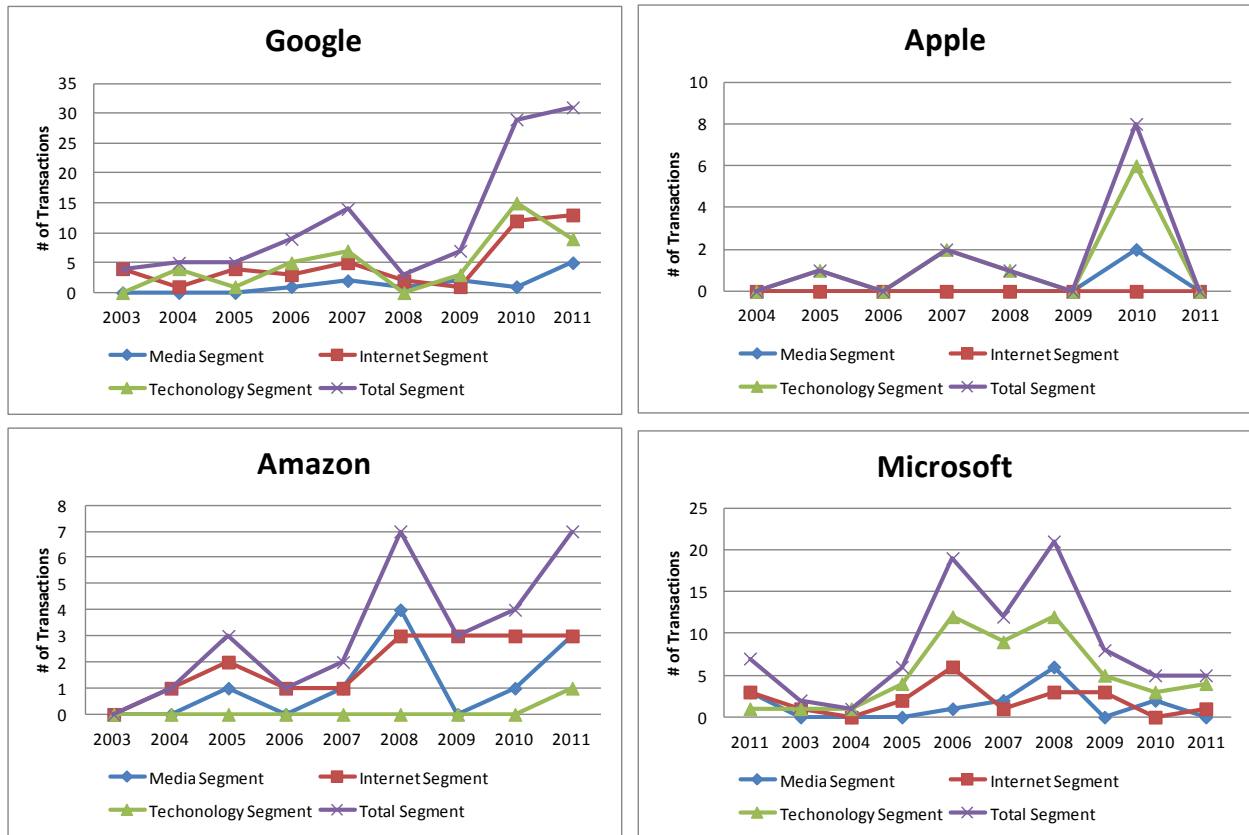
software companies to acquire targets specializing in component technologies. These include a large number of start-ups specializing in application software for media and entertainment, voice recognition, financial services, mapping and imaging, and travel, all of which fall under the Technology Platform category. Companies providing enterprise software, cloud computing technologies, security software and operating system software for wireless devices also comprise a major slice of the Technology pie.

For the dataset we have considered all the identifiable M&A transactions carried out by Amazon, Apple, Google and Microsoft as buyers from 2003 to 2011. These companies have made a number of acquisitions in the M,I,T segments, expanding into new territories and demonstrating the convergence phenomenon that has largely defined the ecosystem. Their selection as sample data points has also been motivated by the fact that they represent a blend of mature and fast-growing companies and therefore provide an ideal mix within the sample set. The underlying time period has been selected from 2003 to 2011 as this period has witnessed a rapid evolution of technology in the ICT industry. It should be noted that the time series data has also been somewhat constrained by the lack of segment information for all the target companies prior to 2003.

The M&A transactions considered for the empirical exercise include acquisitions by each company and / or its subsidiaries, but exclude joint ventures, minority holdings and business partnerships. While the set of transactions has been principally based on those reported by Capital IQ, it has also been supplemented by additional information from industry reports, press articles and company filings. The transactions for each company have then been assigned to the MIT segments, based on the core focus area of the target.

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**Figure 2. Number of M&A transactions in MIT segments by company**



As a next step we have classified the revenues for each company into a similar MIT scheme in order to understand how growth in each sector has impacted the M&A strategy. Starting with the revenue breakdown in the annual filings, each segment reported by the company is then allocated proportionately to the Media, Internet Services and Software and Technology Platform categories based on our understanding and analysis of the products included in each division. The proportions assigned to each segment are illustrated in the tables below:

**Figure 3. Revenue allocation according to MIT Scheme**

**Apple - Revenue allocation according to MIT**

	M	I	T
Desktop			1.00
Portable			1.00
Ipod			1.00
Other music related products and services	0.60	0.30	0.10
iPhone and related products and services			1.00
iPad and related products and services			1.00
Peripherals and other hardware			1.00
Software, service and other net sales		0.25	0.75

**Microsoft - Revenue allocation according to MIT**

	M	I	T
Windows & Windows Live		0.20	0.80
Servers and Tools			1.00
Online Services	1.00		
Microsoft Business Division		0.20	0.80
Entertainment and Device	0.20	0.10	0.70
Unallocated and other		0.50	0.50

**Amazon - Revenue allocation according to MIT**

	M	I	T
Media	0.75	0.25	
Electronics		0.95	0.05
Other		0.50	0.50

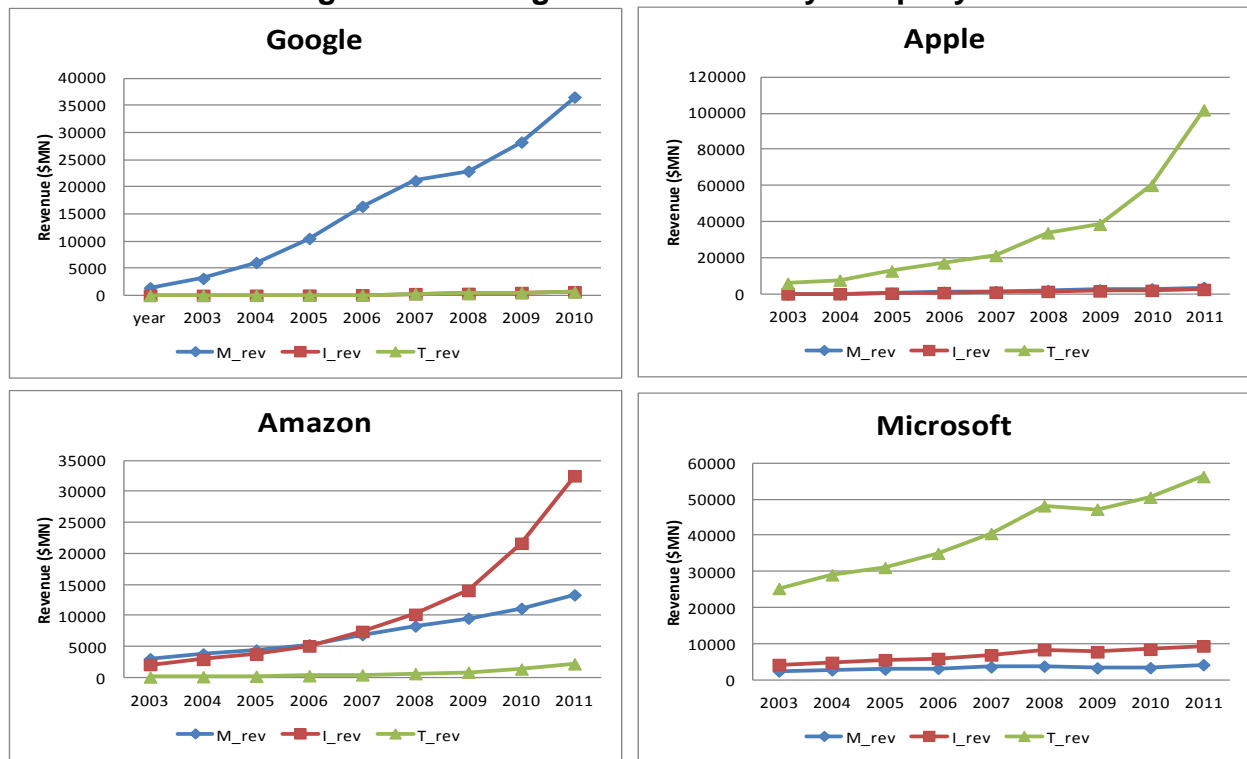
**Google - Revenue allocation according to MIT**

	M	I	T
Google Website	1.00		
Google Network Website	1.00		
Other Revenues/ Licensing and other revenues		0.50	0.50

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Applying these percentages to the reported revenue for each division, we derived the “MIT revenue breakdown” for our four main companies. The data for this part of the analysis is based on fiscal year numbers. Therefore in order to account for the non-December fiscal year ends of Apple and Microsoft, the number of acquisitions for each year has been calculated over the reported fiscal year period, to maintain consistency with the revenue numbers.

**Figure 4. MIT segment revenues by company**



We have also collated data on the revenue and number of M&A transactions as a buyer, for 31 companies in the US (apart from Apple, Amazon, Google and Microsoft) in order to study the relationship between M&A and revenue growth at an industry level. The companies shortlisted for this purpose have been derived from Capital IQ based on the following criteria:

1. Industry Classification: Information Technology
2. CY 2011 Revenue (\$USD mn at historical rate): > 5,000
3. Geographic Locations: United States of America
4. # of Transactions as Buyer: [1/1/2004-12/31/2011] > 9

All revenue and M&A information for these companies have been sourced from Capital IQ. In order to maintain comparability across companies, the revenue and M&A data have been calendarized.



## 4. Illustration of M&A Strategy

Before presenting the results of the statistical analysis, we would like to analyze some of the different motivations behind the M&A strategy of these four companies and how these helped in expansion of their product portfolio, countered competitive pressure, aided entry into adjacent business lines and often positioned them for enhanced growth and profit. We have tried to provide a few representative examples of some of the above.

1. **Expansion of product offerings:** Companies have often used M&A as a vehicle to expand beyond their core focus areas to move into adjacent business lines. This is not only aimed at gaining economies of scale and enhanced customer base, but often also used to kill competition.
  - a. *Amazon's acquisition of Zappos.com, Diapers.com and Soap.com:* The acquisition of online apparel and shoe retailer Zappos was a significant milestone in converting Amazon from a core media product seller to a more comprehensive online retailer. The acquisitions of Diapers.com and Soap.com, which sell baby products and household essentials, was another major step towards that direction. These transactions also fit their ongoing strategy of taking over a rapidly-growing competitor within a niche business area.
2. **Ecosystem synergy:** M&A synergy where the value of combined enterprises is expected to exceed the sum of their individual values is a familiar notion. Revenue synergies are anticipated top-line enhancements that are expected to come from use of the acquirer's superior distribution capability, cross-selling of companies' products or effective integration across an industry value chain. Cost synergies, such as head-count reduction from redundant overhead, on the other hand are more in control of the acquirer. Synergy can be represented by the equation  $V(A + T) > V(A) + V(T)$ , where  $V(A)$  is the value of the acquirer and  $V(T)$  is the value of the target. Here we have looked at what can be a potentially richer form of M&A synergy, given that evidence exists that initiation of a series of acquisitions as part of a strategic M&A program is associated with value creation.

Ecosystem synergy exists where target acquisitions have synergy not only directly with the acquirer, but also with each other. In other words,  $V(A + T_1 + T_2) > V(A + T_1) + V(A + T_2)$ , where  $A$  stands for the acquirer, and  $T_1$  and  $T_2$  stand for distinct targets that have synergies with each other in addition to synergies with the acquirer.

- a. *Google's acquisition of DoubleClick, Admob, InviteMedia and Admeld:* Google has engaged in a series of advertising-related acquisitions that have helped the company cover the value chain of advertising. With the acquisition of Admeld in 2011, Google's vertical integration was complete with online ads typically starting with the advertiser and going through an ad agency to a demand side platform (Invite Media), then to ad exchange

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(DoubleClick), which also interacts with a supply side platform (Admeld) before finally reaching users through services such as YouTube (acquired by Google in 2006). In addition, the AdMob acquisition provided Google with one of the largest mobile advertising networks. These acquisitions therefore not only had a significant positive impact on Google's revenue model as standalone businesses, but also had a synergistic relationship with each other, leading to greater cumulative value creation within the system.

3. **Cluster of acquisitions:** An oft-practiced M&A strategy for these four companies has been to make a number of smaller related acquisitions within a particular space, creating some sort of a "cluster". This is aimed to help the acquirer provide a more comprehensive set of offerings and consolidate its position within a particular product line. While these clusters almost always enhance the acquirer's services as a whole, they may be complementary to or independent of each other and therefore may or may not lead to ecosystem synergy.
  - a. *Microsoft's acquisition of Calista Technologies, Softricity and Kidaro:* Microsoft acquired Softricity in 2006, a provider of application virtualization and dynamic streaming technologies, whose virtualization technology became one of the early components of the Microsoft Desktop Optimization Pack (MDOP). Continuing with their focus on improving the user experience within virtualization, Microsoft acquired Calista Technologies in early 2008 which provided graphics technologies for next-generation desktop and presentation virtualization solutions. The Kidaro acquisition soon after, enhanced Microsoft's enterprise desktop virtualization offerings, providing the company with backward compatibility necessary for upgrading to new versions of Windows.
  - b. *Google's acquisition of On2 Technologies, Widevine Technologies and Fflick:* A corollary purchase to Youtube, On2's acquisition was a stepping stone in Google's video efforts as they open-sourced On2's video compression technology VP8 as a crucial piece of their WebM project. With this, Google decided to switch Youtube over to WebM for both new videos as well as its existing catalog. Similar to On2, Widevine was also a follow-on acquisition within the YouTube-related cluster. Its leading DRM technology was not only expected to help Google launch Google TV on a larger number of connected devices but also pave the way for providing more long-form premium content on YouTube. Finally, the acquisition of movie recommender, Fflick was believed to have been made to boost Youtube's proposed retail movie business.
4. **Beating the competition:** Each of our target companies started out with a core focus area of Media, Internet or Technology which had historically served as their principal revenue generator. However the convergence of these sectors and the resultant interdependence of their sub-segments prompted the companies to seek out other opportunities and expand in related business areas. This usually

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came in the form of a spurt in M&A activity since they needed to acquire existing players in the space in order to establish a quick presence in these new fields and provide a credible challenge to the current market leader. The examples below illustrate this point.

- a. *Microsoft's acquisition of Massive Incorporated, aQuantive, ScreenTonic, AdECN, YaData, Navic Systems and Rapt*: Microsoft made a series of acquisitions between 2006 and 2008 within advertising in an effort to get a slice out of the fast-growing online ad revenue pool and combat Google's meteoric growth over the same period. These acquisitions brought on the table a number of capabilities including mobile advertising, in-game advertising and improved ad targeting. Specifically Microsoft's acquisition of aQuantive, which provided tools for better monetization of ad inventory and helped design ads, was considered as the company's attempt to match Google's acquisition of DoubleClick. (Note: The attempt did not prove successful as the aQuantive deal was later written off.) The ad exchange platform acquired through the AdECN transaction was another effort in that direction.
- b. *Apple's acquisition of Quattro Wireless*: Following its rumored failed bid to acquire Admob, which was finally taken over by Google, Apple announced the acquisition of Quattro Wireless in 2010, two months after the Admob deal announcement. Recognizing the importance of gaining a foothold in the high-growth mobile advertising market, this acquisition provided Apple with a notable presence in the segment and the ability to try to narrow the gap with the market leader.
- c. *Google's acquisition of Upstartle, Tonic Systems, Zenter, AppJet and DocVerse*: After consolidating its position as the world's leading search engine, Google attempted to diversify in a number of different directions including social networking, office products, local content, mapping and imaging, among others. While some of these like local content and mapping further enhanced their search capabilities, a series of transactions in office products was aimed at improving GoogleDocs and directly taking on Microsoft at one of its core revenue generators.

Despite opening up new opportunities, spurting revenue growth and positioning the acquirers to take better advantage of the converged MIT system, M&A strategies have not always been able to deliver the expected results. Some of the big-ticket acquisitions that failed to gain traction and have ultimately been closed by the acquirer include Microsoft's acquisition of aQuantive (as mentioned above) and AdECN in 2007 and Google's acquisition of dMarc Broadcasting in 2006.

## 5. Hypotheses and Results

This research develops a three-step hypothesis to look into the relationship between M&A activity and revenue (growth). The first step is to explore if revenue growth in the MIT segments impacts the number of M&A transactions within the corresponding

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segment, for Amazon, Apple, Google and Microsoft. This divisional analysis becomes relevant in the context of the convergence phenomenon as observed in the ICT industry and classified within our MIT framework. The second step is to analyze if revenue CAGR over certain periods of time (2005-08 and 2008-11) impacts the number of M&A transactions over the same period. For this step, the sample data consists of 31 IT companies in the US in addition to our preliminary set of four companies. This process also helps us in positioning our four target firms within a broader universe of comparable companies. In order to further investigate the relationship between revenue and M&A, our paper adopts a two-way approach where we also look at the role of M&A in driving revenues. This is done in the third step where the empirical analysis is carried out again at the MIT level. The analyses in this paper gain more significance given that there is currently limited empirical research on the role of M&A within the converging ICT industry.

The following hypotheses are proposed and tested through economic models and regression analyses. The variables for the hypotheses are described below.

### Description of key variables

m\_rev: Revenue in media segment for each firm in year t

i\_rev: Revenue in internet services and software segment for each firm in year t

t\_rev: Revenue in technology platform segment for each firm in year t

tot\_rev: Actual total revenue for each firm in year t

m\_grow: Revenue growth in media segment for each firm in year t from year t-1

i\_grow: Revenue growth in internet services and software segment for each firm in year t from year t-1

t\_grow: Revenue growth in technology platform segment for each firm in year t from year t-1

tot\_grow: Actual total revenue growth for each firm in year t from year t-1

m: Number of M&As in media segment in year t

i: Number of M&As in internet services and software segment year t

t: Number of M&As in technology platform segment in year t

o: Number of M&As in other segment in year t

tot: Total number of M&As in year t

**5.1 Hypothesis 1: For Amazon, Apple, Google and Microsoft, revenue growth in the MIT segments impacts the number of M&A transactions within each segment for the same year.**

We tested the hypothesis using 3SLS regression and found the results to be statistically insignificant for all of them.

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**Table 1. Results for Growth Impact on M&A (Hypothesis 1)**

Dependent /Explanatory Variable	M	I	T	TOT
m_grow	-1.055543* (.6050123)	-0.5203012 (0.8188163)	1.371608 (.9941124)	
i_grow	1.686812 (1.935237)	3.079119 (2.436819)	-5.177846 (3.077217)	
t_grow	-1.536744 (1.919387)	-1.990831 (2.421655)	3.707347 (3.054661)	
rd_per	6.449678 (6.628743)	27.76122* (13.19471)	66.91007* (13.55914)	103.904* (28.04799)
tot_grow				- 0.6892221 (1.840803)
_cons	1.147854 (.7975746)	.1151687 (1.424079)	-2.077066 (1.522677)	- 0.7411429 (2.875761)
R-sq	0.1693	0.1547	0.4969	0.3488
chi2	6.82	11.21	28.74	14.66

At 10% Significant Level

### 5.2 Hypothesis 2: Revenue CAGR (2005-08 and 2008-11) Impacts the Number of M&A Transactions at a Group Level for a Broad Set of 35 Companies, Including Amazon, Apple, Google and Microsoft.

This hypothesis was tested by an Ordinary Least Squares (OLS) analysis as well as an Ordered Logit Analysis (OLA), which have been described below. Using the OLS method, we try to estimate the linear relationship between the number of M&A transactions and revenue CAGR. However the results from OLS are sometimes biased owing to the presence of outliers. In contrast, the association (excluding causation) between a set of variables can be effectively examined using the OLA method, which has therefore been used as an alternative tool to test the above hypothesis.

#### 5.2.1 Ordered Logit Analysis (OLA)

In this analysis, we categorize the number of M&A transactions for the periods 2006-08 and 2009-11 into three segments based on the criteria below:

- ☐ Above 2005-11 average
- ☐ At 2005-11 average
- ☐ Below 2005-11 average

This ordered data is then tested against the revenue CAGR for the corresponding time periods (2005-08 and 2008-11 respectively) to see if a statistically significant

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relationship exists between the two variables.

The variables defined for the purpose of this exercise are the following:

- ☐ Y as a dependent Variable ta0608 and ta0911
  - ☐ Number of M&A transactions above 2005-11 average denoted by 2
  - ☐ Number of M&A transactions at 2005-11 average denoted by 1
  - ☐ Number of M&A transactions below 2005-11 average denoted by 0
- ☐ X as an explanatory variable c0508, ca0508, c0811 and ca0811.

The table below further illustrates the model and the variables defined.

**Table 2. Description of Ordered Logit Model**

Command with Ordered Logit	Y = Dependent Variable	X = Explanatory Variable
Ordered with # of transactions during 2005-08 and 2009-11 (=IF(AO5>\$AO\$41.2,IF(AO5<\$AO\$41,-1,0)) Current CAGR > Average CAGR with 2005-2008 Year = 1	Avg # of M&A transactions (06-08) Avg # of M&A transactions (09-11)	Ordered Value with CAGR 2005-08(ca0508) Ordered Value with CAGR 2008-11(ca0811)
<b>OL Model 1) ologit ta0608 c0508</b>	Ordered Value with Avg # of transactions (06-08)	CAGR 2005-08
<b>OL Model 2) ologit ta0608 ca0508</b>	Ordered Value with Avg # of transactions (06-08)	Ordered Value with CAGR 2005-08
<b>OL Model 3) ologit ta0911 c0811</b>	Ordered Value with Avg # of transactions (09-11)	CAGR 2008-11
<b>OL Model 4) ologit ta0911 ca0811</b>	Ordered Value with Avg # of transactions (09-11)	Ordered Value with CAGR 2008-11

The model chi-square is 1.78 for model 1, 3.67 for model 2, 0.01 for model 3, and 0.30 for model 4 with 1 degree of freedom implying that the results of models 1, 2, 3 and 4 are insignificant. This tells us that the ordered value with respect to average CAGR for each period has no statistically significant effect on the average number of transactions in that period. In addition, the model does not pass the test for significance. The positive coefficient for ca0811 and ca0508 however shows the likelihood that a firm with a higher CAGR will execute a higher number of M&A transactions.

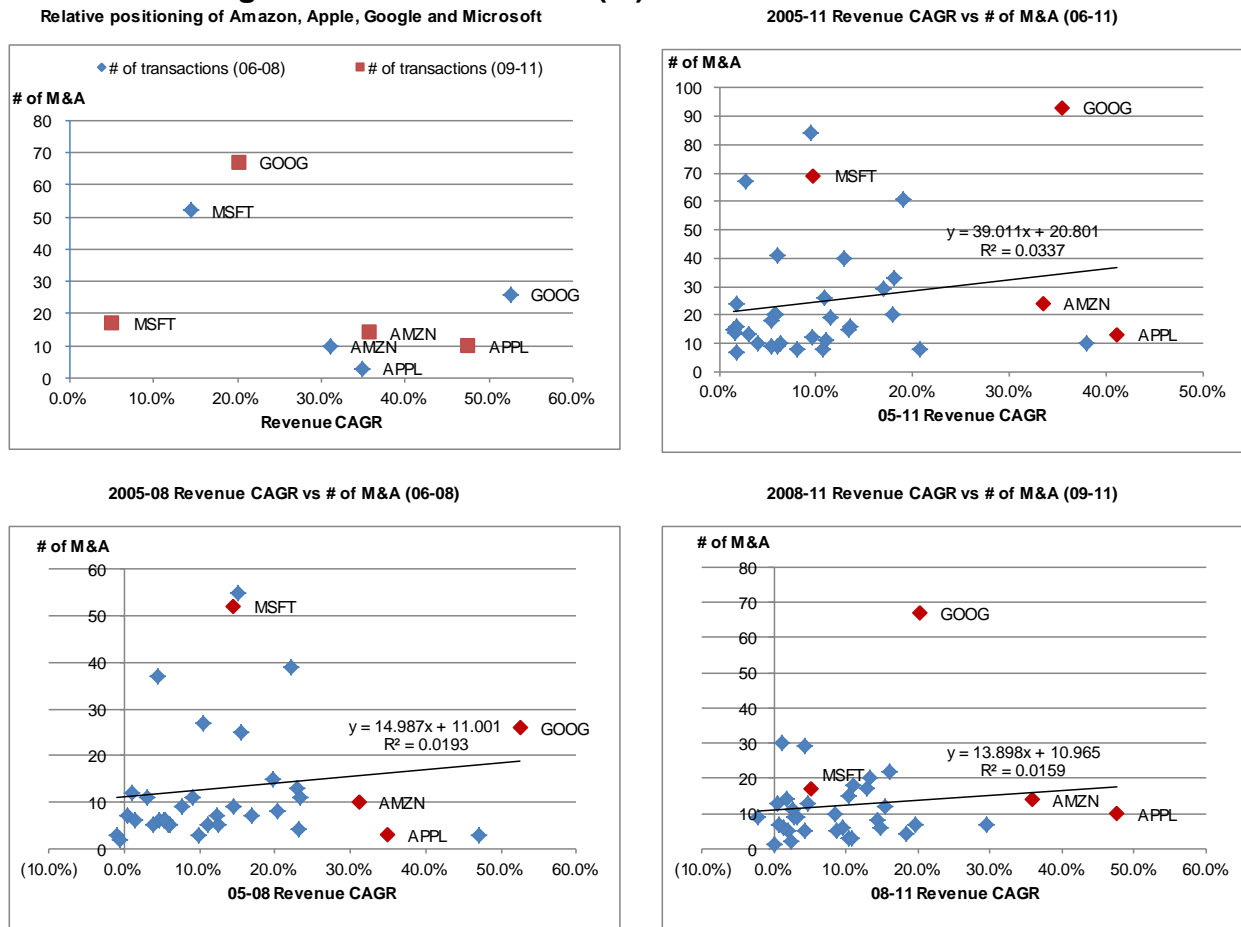
**Table 3. Result Comparison by Model 1 – 4 (Hypothesis 2)**

Number of obs=35	Model 1		Model 2		Model 3		Model 4	
LR chi2(1)	1.78		3.67		0.01		0.30	
Prob > chi2	0.1815		0.0554		0.9180		0.5821	
Coef. (Std. Err.)	4.0592 (3.0563)	0.8146 (0.4542)	-0.3354 (3.2672)	0.1893 (0.3443)				
z P> z	1.33 0.184	1.79 0.073	-0.10 0.918	0.55 0.582				
/cut1	1.8433 .65677	2.954686 1.150661	0.37184 0.47473	0.7662 0.7481				
/cut2			0.4925 0.4780	0.8879 0.7520				

## 5.2.2 OLS (Ordinary Least Squares) Analysis

This analysis shows a positive relationship between revenue CAGR and the number of transactions for each time period. However the OLS model results do not pass the test for significance and the correlation coefficient in each case is very low. Therefore it can be concluded that although a positive relationship exists between revenue CAGR and the number of M&As, this relationship cannot be deemed to be statistically significant.

**Figure 5. Revenue CAGR (%) vs. # of M&A transactions**



## 5.3 Hypothesis 3: For Amazon, Apple, Google and Microsoft, The Number of M&A Transactions in Each of The MIT Segments Drives Revenue in that Segment

The effect of M&A transactions on the revenue of each segment has been analyzed using the econometric model of 3SLS. The advantage of using a 3SLS model is that it provides more efficient results compared to 2SLS and OLS. A 3SLS model is able to access all relevant information about the related variable by running multiple equations simultaneously (Reid, 1996).

In this set of hypotheses, we regress the revenues from each segment as well as the total revenue (endogenous variables) on the number of transactions per segment as

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well as the total number of transactions (exogenous variables). The impact of R&D is also examined and is treated as an exogenous variable for this purpose. The key variables used are defined below:

- ②  $Y = (m\_rev \ m \ i \ t \ o \ rd\_per)(i\_rev \ m \ i \ t \ o \ rd\_per)(t\_rev \ m \ i \ t \ o \ rd\_per)(tot\_rev \ tot \ rd\_per)$
- ② Endogenous variables:  $m\_rev \ i\_rev \ t\_rev \ tot\_rev$
- ② Exogenous variables:  $m \ i \ t \ o \ rd\_per \ tot$

H3-1: A positive relationship exists between Media sector revenue and the number of M&A transactions in that segment.

- ② The 3SLS regression shows a positive coefficient for the relationship between revenue and the number of M&A transactions in the Media segment at a 5% level of significance.

H3-2: A positive relationship exists between Internet sector revenue and the number of M&A transactions in that segment.

- ② The relationship between revenue and the number of M&A transactions in the Internet segment shows a positive coefficient at 5% level of significance. It should be noted that the number of M&A transactions in the Technology segment however shows a significant negative association with the Internet sector revenues.

H3-3: A positive relationship between Technology sector revenue and the number of M&A transactions in that segment.

- ② The relationship between revenue and the number of M&A transactions in the Technology segment shows a positive coefficient at 5% level of significance.

The results from the statistical analyses are detailed in the table below.



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**Table 4. Results for M&A Impact on Revenue (Hypothesis 3)**

Dependent /Explanatory Variable	M_rev	I_rev	T_rev	TOT_rev
M	1390.004** (612.34)	3278.994** (1173.699)	-2908.43 (2079.237)	
I	712.1583** (361.869)	1984.474** (687.5049)	-1886.961 (1277.809)	
T	-55.24861 (262.4679)	-1031.339** (492.4599)	2823.66** (973.9263)	
O	2838.869 (1184.53)	-6365.13* (2278.25)	5525.326 (3957.204)	
TOT				1405.111** (690.4296)
rd_per	114380.3** (25914.23)	-104492.7** (43343.52)	- 447550.7** (127774.2)	- 443814.7** (150021.4)
_cons	- 2134.229 (1647.579)	7416.16 (2778.947)	43030.13** (8007.329)	48497.67** (9286.645)
R-sq chi2	0.8658 154.35	0.5059 25.80	0.5012 29.97	0.2855 8.79

\*\* At 5% Significant Level

\* At 10% Significant Level

An interesting aspect of this analysis is that it not only establishes a statistically significant relationship between M&A and revenues within the same segment, but also shows how M&A is associated with revenues in a different division. For example, the number of Technology transactions positively affects Technology revenues but has a negative association with Internet or Media segment revenues for the same year. Therefore it can be concluded that at a segment level, the number of M&A transactions is positively associated with revenues within the same segment and may have an opposite effect on other segment revenues.

### **5.4 Hypothesis 4: R&D Has a Greater Positive Impact on Revenues Compared to the Number of M&A Transactions**

The empirical result in fact shows R&D to have a negative effect on actual revenues at a 5% significance level. When regressed along with R&D, the number of M&As however shows a significant positive coefficient.

This result is consistently observed across the dataset. This seems surprising as internal R&D is expected to be a major contributor to revenue growth along with M&A, particularly given the increasing trend towards convergence within the Information

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Technology space. One possible reason for the negative association could be the high R&D expenditure of companies like Microsoft which saw moderate growth and the low R&D expenditure of Apple which witnessed exponential growth over the same period. It therefore appears that high R&D investments do not necessarily translate into higher revenue growth and even though M&A is positively associated with revenue growth, there are other factors that influence the actual growth path of each individual company.

### 6. Conclusion and Limitation

M&A has played a key role for companies in developing and providing a broader set of products and services in the MIT segments. This paper proposes a new MIT classification scheme and also analyzes the relationship between M&A and revenue growth and how they impact each other. The financial data for the Media, Internet and Technology segments used in this study has been aggregated from the firms' annual 10K filings while the identifiable M&A transactions for each company have been classified under the MIT scheme based on the target's core business area. For the purpose of the empirical study, ordinary least squares regression, 3SLS and an ordered logit model have been used to determine the relationship between revenue CAGR and the number of M&As executed. The major results observed from the analyses can be summarized as follows.

First, the study points to the fact that the ICT industry has been largely defined through major global players such as Amazon, Apple, Google and Microsoft. These firms have led the convergence trend within Internet, Media and Technology with respect to providing content, internet platform and associated hardware and software technology. M&A has been crucial in developing new products, augmenting existing market share and in gaining traction in adjacent business areas. The increased competition resulting from the convergence within the ICT industry has forced companies to step up their performance and enhance their presence along market value chains. It has provided additional incentive to further develop their services and move into new territories often using the M&A channel.

The second key observation is that, over the analysis period, Google engaged in a large number of M&As and witnessed high revenue growth while Apple also demonstrated a very high CAGR but with a very limited number of M&A transactions. It is therefore hard to argue for a causal relationship between the two variables. For the broader set of 35 US companies in the ICT industry, no statistically significant relationship between the number of M&As and revenue CAGR could be observed, although the model showed a positive trend. The insignificant result could be a fall-out of a number of outliers which skewed the dataset. Therefore analyzing this relationship between M&A and revenue growth through an empirical study at an industry level is complex and would probably need to factor in the company's stage of growth, culture of M&A, demand for core products and expansion policy. Certain specific variables which could provide valuable insight into the key M&A drivers include operating metrics, macro variables and sector growth performance. The current paper does not look at the impact of those variables, but there is ongoing research in that area.

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Even though there does not seem to be any significant relationship between M&A activity and revenue growth in general, the empirical results do point towards M&A being associated with higher revenues at a segment level for the four companies under consideration. This result lends further significance to the classification of transactions in the ICT industry in terms of the MIT scheme. An analysis of the acquisitions made by the four global majors in these segments provides a perspective on the sectors experiencing fastest growth and the most rapid uptake. Understanding these growth trends therefore becomes a crucial element in forecasting future M&A trends, particularly in today's rapidly evolving ICT industry.

Finally, the number of M&As carried out by a company depends on its corporate development strategy. Google and Apple seem to be positioned at opposite ends of the spectrum while Amazon and Microsoft have opted for a more moderate strategy. The study of the MIT ecosystem has shed significant light on the direction of potential future development. Irrespective of the corporate development policy of the individual firms, it can be safely assumed that most M&A efforts will be channelized in those directions.

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Appendix

Appendix 1. Convergence in the MIT ecosystem

