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Need for Speed? Relevance of First Mover Advantage in Emerging Industries:

Lessons from the Search Entry Industry

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Abstract

Despite the perils of first movership, there is stronger support for early entry (Bryman, 1997; Silverman *et al*., 1997) into a marketplace. Arguably first mover advantage is more difficult to attain in high velocity environments, where consumer needs, technological opportunities and competitor activity are constantly in a state of flux (Teece, 2007). The aim of this research is to explore the relevance of first mover advantage to performance in an emerging industry. This research employs a contextually embedded, longitudinal case study of first movership within the search engine industry, using multiple method approach (interviews and documentary evidence). The findings reveal that high performers in the search industry were predominantly early movers. The research also reveals that it was the exploitative behaviour of entrants post-entry or the strategies undertaken, which ultimately explains performance differentials, rather than market entry alone. It is proposed that further research must focus on what capabilities enable first or early movers to first sense the optimal time to enter and to then seize timing advantages in emerging industries. This research posits that the dynamic capability perspective offers conceptual richness to strengthen the first mover theory and form new conceptual insights.

Keywords: First Mover Advantage, Performance, Emerging Industries.

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1.0   Introduction

The rapid rate of change in technologies, markets and other environmental factors, in addition to shrinking competitive entry time (Vakratsas *et al.*, 2003) position market entry as one of the most critical decisions for business survival and performance (Mittal and Swami, 2004). For management, entry choices are thorny as they often reflect a shift in strategy, operations, or business model, and are laden with uncertainty that stretches well beyond the boundaries of would-be entrants (Markman and Waldron, 2014). Consequently, market entry may affect performance and survival for both start-up and established firms alike.

The first mover advantage (FMA) concept has sustained as a prominent area of study within market entry literature and spans several decades. It is a topic that remains highly meaningful for practitioners and researchers, in which the interests of both seem to be well aligned (Fosfuri *et al.,* 2013). It remains an attractive strategy amongst start-ups and management despite higher uncertainty and risk costs, there is potential to build substantial market share and profits pre-competitive entry (Mittal and Swami, 2004; Suarez and Lanzolla, 2007). This is extraordinary when one considers the mixed empirical evidence to support the first mover advantage. In their recent review article, Zachary *et al.* (2015) admit that discovering that the main prescripts of the first mover advantage thinking has endured is surprising, despite twenty-five years of research showing that the direct-effect logic of FMA is invalid. It is questionable then why a concept that has produced considerable debate in academic literature, finds such ready purchase in the social marketplace of ideas (Bolton and Heath, 2005). With its appeal and as a favoured entry strategy, the validity of the concept may be taken for granted (Suarez and Lanzolla, 2007).

In practice, first mover advantage is often high on managers' list of arguments to justify strategic moves such as the entry into emerging markets or the rush into e-business (Boulding and Christen, 2003). The prevalence of assertions of first mover advantage had become a birth right, justifying a headlong rush into investments during the dot-com frenzy, however on reflection the mere fact of entry order offers no support for such a strategy (Zachary *et al.*, 2015). The dot-com crash provided a stark reminder and reasonable empirical feedback about the validity of the pure form of the first-mover concept (Bolton and Heath, 2005) and reinforced that high risk accompanies first mover strategy. In terms of high velocity environments, speed to market is still considered a crucial strategy. There is a prevailing sentiment that cautions 'just don't be last' (Grant, 2016). In fast-paced, globally competitive environments, consumer needs, technological opportunities and competitor activity are constantly in a state of flux (Teece, 2007). In such contexts, it may be argued that first mover advantages are arguably even more difficult to acquire and sustain.

High performers within their respective fields such as Apple, Amazon, Facebook, Google, Uber etc., have all perpetuated and popularised the importance of first or early market entry versus late entry. It is not surprisingly, that a "grail search" in understanding the market entry sustains (Lieberman and Montgomery, 2013: p. 322). It also remains an attractive question for researchers to answer. As academics, Zachary *et al.* (2015) propose," we owe it to the field, and to the managers who we advise, to broaden our thinking about entry considerations or we will just perpetuate the myth that being first creates a competitive advantage" (p. 1410). Market entry

stalwarts Lieberman and Montgomery (2013) also concur that the academic community should attempt to more clearly communicate the nature of the boundaries and uncertainties of knowledge within the field of entry timing. In doing so this will assist practitioners and the public avoid excesses such as those contributing to the dot-com bubble (Lieberman and Montgomery, 2013), which was driven in part by the belief that early entry was essential for long-term success.

In the spirit of broadening our thinking concerning market entry decisions, this research explores the relevance of first mover advantage in emerging industries. Specifically this research explores the relevance of FMA in performance differentials in the search engine industry.

2.0   First Mover Advantage concept

The first mover advantage concept posits that first movers may acquire advantages over subsequent entrants leading to better performance in terms of higher market shares, survival rates or abnormal financial returns (Lieberman and Montgomery, 1988; Miller *et al.,* 1989; Kerin *et al*., 1992; Kalyanaram *et al*., 1995). Scholars exploring timing of entry have largely focused on identifying and understanding the nature of advantages likely to be enjoyed by first movers (Enderwick, 2004), where advantages are believed to enhance the magnitude and durability of a sustainable competitive advantage. It is a topic that has retained importance both in strategy literature (Varadarajan *et al.,* 2008) and in popular business press (Liang, 2009).

Initial empirical work focused predominantly on the main effect of market entry on performance (dependent variable). There is substantial evidence of a direct relationship between order of entry and market share in particular, which is consistent across multiple early studies (Robinson and Fornell, 1985; Urban *et al.,* 1986; Lambkin, 1988; Kalyanaram and Urban, 1992) and multiple databases (PIMS and ASSESSOR). A significant body of research in marketing, strategy and economics increased support of the validity of the first mover advantage principle (Boulding and Christen, 2003; Lieberman and Montgomery, 2013; Suarez and Lanzolla, 2007, 2008). Despite the empirical sophistication of early studies, research commencing in the '90s revealed difficulties with the direct entry order-performance relationship (Lilien and Yoon, 1990; Mitchell, 1991). Substantial methodological difficulties surfaced leading to contradictory evidence including an over-reliance on the PIMS dataset, definitional inconsistencies of first mover and market boundaries, the use of idiosyncratic samples, omitted variable bias, differences in the operationalisation of order of entry and performance, and survivor bias. In light of this, studies revealed contradictory empirical evidence as to the existence of market share advantages for first movers (Cooper, 1979; Schnaars, 1986; Lilien and Yoon, 1990; Golder and Tellis, 1993; Boulding and Christen, 2008). In fact, many indicate a first mover disadvantage where lower market shares were found for the first and second entrants and higher market share for subsequent entrants. Other streams grew in opposition to FMA, and studies found other entrants may potentially enjoy timing advantages and therefore it is not solely attributed to first movers (Lieberman and Montgomery, 1998; Cho *et al.,* 1998; Shamsie *et al.*, 2004).

First mover advantages are not nearly as automatic as previously believed and commonly portrayed (Lambkin, 1992). In fact, Bryman (1997) concluded, "the picture is manifestly more complex than one that depicts first mover advantage as definitive" (p. 434). As most entry choices are linked to a sundry of contingencies that interact with firm-specific heterogeneity (e.g., rivals, consumers, opportunities, market risks and technological uncertainties), advantages of moving first may not, therefore, be unique to first movers and may work equally well to benefit early or late movers (Zachary *et al.*, 2015). This supports a broader view of entry timing as just one of many contingent factors proposed. In fact Lieberman and Montgomery (2013) now favour the term "entry timing effects" (p. 317) rather than first-mover advantage and disadvantage. This also broadened the conceptual focus beyond first movers to other market entrants i.e. early movers, fast followers and late movers.

May contributors have proposed that the order of entry effect should be modelled as a conditional rather than a main effect (Markides and Sosa, 2013; Hawk *et al.*, 2013; Suarez and Lanzolla, 2007) and this perspective has gained precedence. It also is more fitting to practice as entry does not occur in isolation and arguably involves on-going efforts by management or the entrepreneur. In short, a variety of factors can help or hinder firms from entering a market early. However, mixed empirical evidence and mixed explanations that has led to a "sizeable and diverse" literature (Szymanski *et al.*, 1995: p. 18). Disparate contingencies and mixed findings have subsequently made interpretations of the research "rather unstable" (Zachary *et al.*, 2015: p. 1393). More critically the literature lacks theoretical fortitude or insights that could best guide empirical work and subsequently provide coherent guidelines for managers (Suarez and Lanzolla, 2007; Short and Payne, 2008; Klingebiel and Joseph, 2016).

Despite the well-established conundra of FMA, the conventional wisdom amongst practitioners considers first movership as a preferred entry strategy. More recently, contributors within the market entry literature have questioned the 'usefulness' of the FMA as an isolated concept. Lieberman and Montgomery (2013) posit that first mover advantage is an attractive phrase, but it serves primarily as a macro for a variety of specific mechanisms that perhaps should be studied individually and in interaction rather than under a common rubric. The appeal of simple prescriptions, combined with the ambiguities and misconceptions, may account in part for the often naïve use of the FMA macro (Lieberman and Montgomery, 2013). Therefore, this questions if FMA has become a 'red herring' (Zachary et al., 2015) that essentially may deprive attention from more important and more nuanced entry considerations. Market entry is highly contextualised and FMAs are often context specific with only a few regularities. There is a lack of prescriptive models in terms of guidance regarding strategic choices under different conditions, where entrants change their strategy in response to market conditions, while market conditions shift as a result of entry and players behaviours (Short and Payne, 2008). This is even more pertinent in terms of high velocity contexts such as emerging industries, where external shocks are arguably more frequent. Perhaps troubling is that many managers and scholars are attracted to the need for speed within such environments.

This research explores the relevance of the first mover concept in an emerging industry. It examines FMA in terms of performance differentials with other market

entrants in a turbulent environment with many inflection points i.e. market and technology shocks.

3.0   Methodology

A longitudinal case study of the search engine industry was conducted in order to explore the research question. There have been continued appeals for longitudinal research within FMA literature (Camerer 1991; Golder and Tellis 1993; Golder 2000; Lieberman and Montgomery 1988, 1998; Lieberman and Montgomery 2013). It presents an alternative to broad cross sectional studies, which have dominated the literature, and allows for a focus on an in-depth study. A longitudinal case study also facilitates the inclusion of non-surviving first movers, precursors and other entrants, which may influence in terms of the previous learning and cumulative effect of technology etc. The lack of longitudinal studies is surprising given that market entry involves the evolution of resources, markets, consumers and the environment over time. This research is also timely in terms of on-going calls in the literature for 'new data' and the value of understanding entry both longitudinally and contextually (Lieberman and Montgomery, 2013; Enderwich, 2004; Zachary *et al.*, 2015).

The use of an in-depth single case is most effective (versus multiple cases) when the research goes beyond mere description of a particular phenomenon, and the aim is to provide conceptual insight (Siggelkow, 2007; Easton, 2010). In terms of this research, it represents a critical case in understanding a well-formulated theory and allows the study of particular nuances as conditions change over time within one industry (Yin, 2003).

The search engine industry offers a "unique lab" (Lieberman, 2007) to assess FMA in an emerging industry. This is reminiscent of the broader context of the early growth phase of the internet sector which was widely characterised as a 'land grab', where firms rushed to acquire market positions and create business models, before competitors had an opportunity to do so (Lieberman, 2007). It offers a case where a later mover successfully superseded first movers, and so incorporates first mover failure. Although Google became market leader within search and were considered to be the "grandest declaration of the power of search" (Battelle, 2005: p.37), it was by no means the first search engine in existence. The search engine context also provides an acceptable history for a longitudinal study, in that the inception of the industry was in the mid-90s. The study tracks the chronology of over twenty market entrants including first movers, AltaVista, Excite and Lycos, early entrants Ask Jeeves, MSN and market breaker, Google and later entrants including Cuil, Blekko and MSN's Bing over seventeen years from 1993 to 2010. There is prolific documentary evidence of the search industry as it has evoked much interest since its inception as it developed with the web. The focus for this case analysis is specifically the U.S. search industry. The industry originated predominantly in the U.S. and the majority of first and early movers were US-based initially. While the value of the inclusion of a global focus is recognised, it is beyond the scope of this research and would entail the inclusion of many other players in a 17-year longitudinal case study. It would also raise difficulties in terms of collecting primary research in terms of both interviews and documentary evidence (where the focus has firmly been the U.S. market).

Within this contextually embedded longitudinal study both qualitative and historical data were employed. A mixed method approach provides a more comprehensive and rigorous case analysis. Multiple methods were employed using both documentary evidence and interviewing which assisted in the corroboration and triangulation of the data. The documentary evidence was collated from key reports, press releases, company information etc. from key industry analysts and commentators. On-going documentary evidence was central in understanding the inception of the industry, the chronological order of market entrants, key milestones and the broader web context. Purposive, non-random sampling was employed in terms of interviewee selection of industry analysts, first movers and other players of the industry. Twenty-six semi-structured interviews were conducted consisting of sixteen key search players (both non-survivors and present players) and ten key industry analysts (see appendix 1 for profile of respondents). Interviews were conducted face-to face where possible, and also via telephone, Skype or email. Interviews, which varied in length from 30-90 minutes, were recorded and transcribed.

O' Dwyer's (2004) qualitative analysis process was adopted consisting of three concurrent flows of analysis activity, namely data reduction (open, axial and selective coding (Corbin and Strauss, 2008), data display (contact summary forms, conceptual memos and matrices) and data interpretation. In terms of document analysis, historical analysis was specifically employed. This involved collating data, critically evaluating evidence and sources, analysing and interpreting the data (using thematic codes) and finally the presenting the findings and conclusions in the form of longitudinal case study of search engine industry.

4.0   Findings

From extensive documentary evidence and in conjunction with interview data, a timeline of the order of market entry (see appendix 2) and the key milestones of the search engine industry (see appendix 3) were compiled. In addition to documenting the chronology of entrants, this was pertinent in terms of assessing performance and strategy differentials of market entrants and their evolution. This was fitting given the overall aim of the research is to present a context-rich longitudinal study of FMA and performance differentials in an emerging industry.

4.1   Classification of Market Entrants

Prior to assessing the relevance of FMA and performance differentials in the search context, it was important to classify the market entrants. In doing, so some difficulties emerged in terms of defining precisely the first movers, early movers and late movers. Such difficulties can be attributed to the speed of entry within this breaking industry, where many players entered within weeks or months of each other. Also there were challenges in terms of the varying metrics used to denote market entry and defining first mover in terms of first technology, first to market beyond academia, first to commercialise search etc. This research used triangulation of sources to collaborate findings with regards to the classification of market entrants. Market entry was framed in terms of waves of entry, rather than a discrete first mover, early movers, late movers etc. (Rob, 1991; Markides and Geroski, 2005). This is considered reasonable due to the close succession of entrants where new technological and market developments resulted in new waves of market entrants and

competitors to the marketplace. Precursors are also identified in order to understand their influence on subsequent movers, and offer a more inclusive approach to understanding the FMA concept. Table 1 below compiles a summary of an inexhaustive list with the classification of key market entrants.

Table 1 Classification of Search engine market entrants

Precursors (1990-1993) First generation of IR/search technologies.	▪ Veronica ▪ Aliweb ▪ Jumpstation ▪ WWW Wanderer ▪ WWW Worm ▪ RBSE ▪ Archie	Predominantly university-based, no business models or market in existence, academic and 'techy' audience.
First Movers (1993-1995) Search engines/directories with commercial intent.	▪ Lycos ▪ Excite ▪ WebCrawler ▪ Yahoo ▪ AltaVista ▪ Infoseek	Scaling technologies with commercial intent beyond academia, business models in place, emergence of the consumer web.
Early Movers (1995-1998) Entered in quick succession of first movers, includes content providers.	▪ Google ▪ Ask Jeeves ▪ AOL ▪ MSN ▪ HotBot	Technological innovation and refined consumer offering, mainstream adoption, web-specific business model-PPC model.
Later Movers (Post 1998) Players referred to as 'post-Google' entrants.	▪ Blekko ▪ Cuil ▪ Snap ▪ Bing ▪ Duckduckgo ▪ Ixquick	Nicher strategies (spam-free, private searches etc.).

4.2 Performance differentials in the Search Engine Industry

Firstly, there is evidence of FMAs in the search context including gaining a critical mass of users, establishing a brand and reputation, strong market valuation and market share. Performance differentials were subsequently assessed over the evolution of the search engine industry.

4.2.1 Early Performance in Search Industry

In terms of assessing performance of first movers, early performance indicators were expressed in terms of reach or the amount of the web indexed and search queries per day (Bolton, 2001; Player no. 5). Obtaining comparable market share data for early

search entrants presented challenges[1]. Table two below highlights two key measures, namely the amount of the web indexed (pages) and search queries (per day) in order to compare performance across key players from 1994-2000[2].

<div align="center">Table 2   Performance in search 1994-2000</div>

	1994	1995	1996	1997	1998	1999	2000
WWW Worm	*Web index: 110,000 Search queries: 1500*	-	-	-	-	*Web index: 2m*	-
Alltheweb	-	-	-	-	-	*Web index: 200m Search queries: 1.2m*	*Web index: 275m*
WebCrawler	*Web index: 50,000 Search queries: 6000*	*Search queries: 1.5m*	*Web index: 500,000 Search queries: 3.2m*	*Web index: 100m Search queries: 5m*	-	-	-
Yahoo	50,000 hits per day	1m hits per day	6m per day	65m hits per day	207m per day	470 m per day	900m per day
Excite	-	*Web index: 1.3 m*	*Web index: 50m*	*Web index: 60m*	-	-	-
AltaVista	-	*Web index: 2.5m*	*Web index: 16m*	*Web index: 100m Search queries: 25m*	*Web index: 140m*	*Web index: 150m*	*Web index: 270m*
Lycos	*Web index:*	*Web index:*	*Web index:*	*Web index:*	-	-	-

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[1] Pollock (2012) notes that the number of unique visitors a month was recorded rather than giving a breakdown of the number of hits, which may distort results since pure-search providers, are much more likely to have multiple visits from the same user than more portal-like sites. Further to this, many search sites had search powered by a third party provider, for example pre-2004 Yahoo 'bought in' results from Inktomi and then Google (Pollock 2012). Also early market share figures available are often in terms of particular followed references (or keywords) and so does not present market share in a general sense (Selberg and Etzioni, 1995). As different measures were used (number of pages indexed, number of visits per day, number of search requests etc.) it was challenging to compare across different players and different years.

[2] Data for some players was unobtainable in certain years. This may be also owing to the fact that some had not entered the market at that point, some were acquired or ceased to exist and had exited the marketplace and others had outsourced for their search results and ceased indexing the web (Excite etc.).

	349, 000	1.5m	19m	60m			
AOL	-	-	5,000,000 members	-	-	-	-
Inktomi	-	-	*Web index: 35m*	*Web index: 100m*	*Web index: 110m*	*Web index: 120m*	*Web index: 450m*

Source: Data compiled using industry analysts reports Battelle (2005), Search Engine Watch, Rashtchy and Avilio (2003), company annual reports and press releases and interview data.

The table highlights the speed of growth of web pages indexed and there were no clear market leaders amongst first and early pure search engines (excluding directory Yahoo) until the entry of AltaVista in 1995. Following AltaVista's entry in 1995, they quickly captured lead position, and indexed ten times more than its closest rival (Chmielewski, 2000). By the end of 1997, AltaVista and Inktomi claimed the bragging rights of being biggest indexes (Sullivan, 2005). As of May 1999, AltaVista held 27% of web indexed with Northern Light at 25% and Inktomi at 20% (others included FAST at 15%, Excite at 10%, Lycos at 9%, Infoseek at 8% and WebCrawler at 0.4%) (Sullivan, 2009). Alltheweb entered the market in 1999 and superseded AltaVista to index 200 million pages. However, despite the undeniable reach and innovations of early crawlers, as the web grew so did the continuing challenge to index it all. Chmielewski (2000) states that the bragging ceased in April 1998, when Science magazine reported search engines' shocking secret that the top 11 search engines combined covered only 42% of the web, according to NEC Research Institute in Princeton, NJ[3].

4.2.2 Google entry- industry shakeout

It is evident from the interviews and documentary evidence that Google's entry in itself was considered a "defining moment" (Analyst no. 3) in that "search came back to the forefront" (Player no. 3). First mover and market leader, AltaVista, dramatically lost market share to Google over a six-month period in 2001. Sullivan (2004) recalls that Google sucked in AltaVista traffic as well as traffic from others in what he refers to as the Google-AltaVista X, because of the way the traffic lines cross via the December 2000-May 2001 in Media Metrix figures (see appendix 4). It clearly illustrates Google's "metroic" rise in market share (Player no. 16) (see appendix 4). Despite first movers' brands, capital resources, user base and reputation, Google "came out of nowhere" to dominate search (Sullivan, 2003). Google essentially "caught everyone by surprise" (Player no. 2). At early developmental stages, the value of the PPC model may not have been initially clear to incumbents, but "it ultimately won the race" (Viney 2007b). Portals such as Excite and AltaVista "started moving back into search" (Player no. 2), where a clear monetisation route now existed with minimal disruption to the user. This also presented Google and Overture (formerly GoTo) the opportunity to become key suppliers of paid listings to the other players

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[3] Northern Light was listed as one of the leading index sites even though it covered only 20 per cent of an estimated 800 million pages. Well-known sites Excite and Lycos had the lowest percentage of web pages in their indexes, with only six to eight per cent of the web covered. Moreover, these figures all fell as the web grew.

including Yahoo, MSN, AOL, Lycos, AltaVista and Ask Jeeves (Rashtchy and Avilio 2003). This further increased their market share (Knowles, 2008).

Google had become the dominant design in the dominant category i.e. search engine and this is evident in terms of web indexed and market share figures compiled using documentary evidence. By 2002 in terms of the web indexed, the key players were Alltheweb (2 billion), AltaVista (1 billion), Inktomi (3 billion) and Google (2 billion). Google's had increased exponentially from 24 million in 1998 to 1.2 billion in 2001 and 2 billion in 2002 and continued to do so (see Fig 1 below).

Fig. 1 Web indexed – billions (1995- 2003)
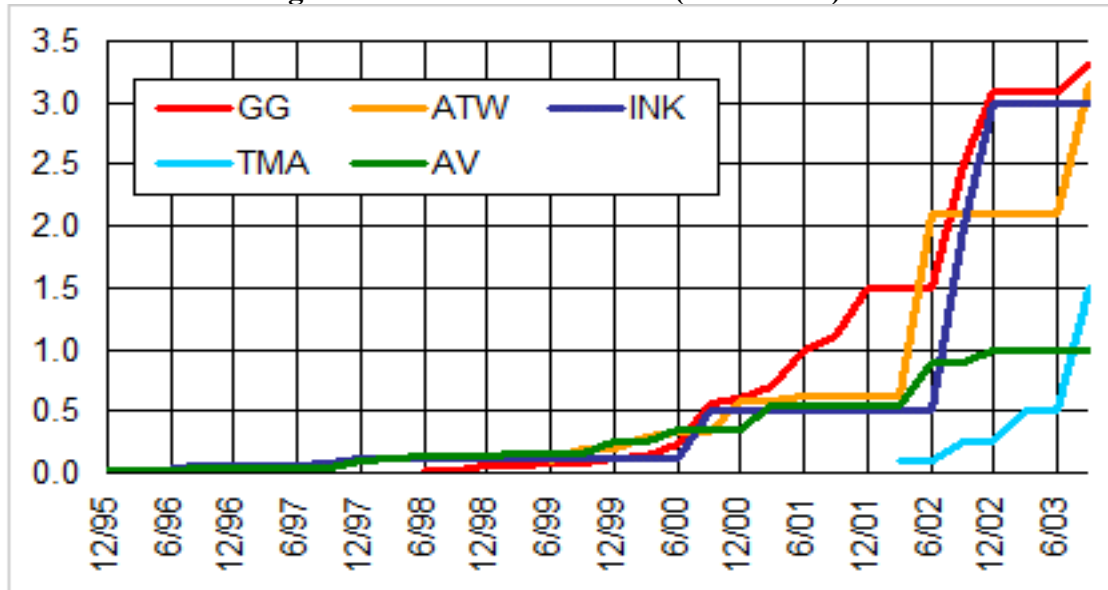
Source: Sullivan (2005)[4]

Compiling a precise market share data series[5], continued to present challenges in that there are varying percentages across different data sources. Also following consolidation, market share measurement concentrated on the key players in search who had effectively acquired the smaller players. Schwartz (2014) states that even though comScore declared that Google's U.S. market share was at 65-68%, other analytics reports have placed Google closer to 85-90%. The dotcom crash clearly

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[4] GG- Google, ATW- AlltheWeb, INK- Inktomi, TMA- Teoma, AV-AltaVista

[5] Many different sources have been consulted in this research in terms of compiling market shares figures including Net Market Share, Statista, Global Stat Counter, Hitwise, comScore's MediaMetrix, Nielsen NetRatings (corroborated by from documentary evidence and by reputed industry analysts). Many sources use different measures in terms of assessing market share and also different methodologies are used in collating the data. Market share measures include views per day (view of website per day), organic visits (searches based on relevance to search terms as opposed to begin from adverts), search referral traffic (how many people are driven to sites based on searches they perform where much-used search engines generate more referrals than led-used one) with the dominant measure being the percentage of total of searches conducted. Net Applications and WebSideStory (WSS) collect data from web analytical applications installed on customers' sites, whereas NetRatings and MediaMetrix collect data directly from the users rather than the websites they visit (Pollock, 2012). Adding to the difficulties is that many of the search destinations do not disclose their search volume figures which contributes to the 'arduous task' of total number of queries performed and subsequently the share of each individual search destination (Rashtchy and Avilio, 2003: p. 15).

affected market share also, as it "shook out a lot of players and allowed Google to thrive" (Battelle, 2005: p. 2). Prominent first movers had dropped significantly in search share from 1997-2001 and Google had effectively surpassed AltaVista, Inktomi and Alltheweb as market leaders. Notably Excite had decreased in market share from 20.3% to 7.4%, Infoseek from 13.2% to 7.4%, AltaVista from 12.1% to 7.4% and Lycos from 4.5% to 4.1% (Noam, 2016). There were also fewer players competing within the search space (Player no. 12; Player no. 15). Dolbeck (2003) states by 2003 the market was clearly dominated by Google. Rashtchy and Avilio (2003) reports that by 2003 the top four destinations (Yahoo, Google, MSN and AOL) consisted of 82% of the overall market share with Google leaders at 34%. Therefore sustained high performers in search at this point were early movers to the marketspace and not first movers. Yahoo was the only exception or the only classified first mover that sustained in the search space although not as market leaders.

4.2.3   Performance post Google

Bosch *et al.* (2016) note that historically, having the biggest index size provided search engines with a competitive advantage, but a changing focus on other aspects of search result quality, such as relevancy and personalisation, has diminished the importance of index size in more recent years. In terms of performance, accessing market share figures for later movers and their impact on the leaders in search again was difficult as comScore for example compare only market share of the top five search engines. Many smaller players are classified as 'others' and are not specified individually, where many are no longer separate entities (e.g. Yahoo acquired Inktomi, Overture and AltaVista). It is clear, however, that later movers had minimal impact on the market share of the market leaders Google, MSN and Yahoo. Of note, Sullivan (2008) estimated that Blekko with 30 million searches a month held a mere 0.0011% share of the explicit core US search queries in 2010. Also Cuil following its launch in 2008, suffered from an initial server crash, complaints over accuracy and the loss of co-founder Louis Monier, had market share of 0.01% according to Net Applications (Snyder, 2008).

In terms of market share, Google had clearly maintained market leadership in US. They continually invested in their core search technology in addition to new product development with a suite of products both search and non-search-related (as did key players Yahoo and MSN). Table 3 captures the market share of the key players from 2004-2010. For ease of comparison comScore was chosen in terms of providing a reputable source as corroborated across many analysts and commentators of the search industry. Also, comScore released a new service in 2003 called qSearch[6] to

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[6] "ComScore Networks is known for its Media Metrix web traffic reports, launched a new service to track and report on searchers' actual unique queries across 25 major search engines and portals in 2003. Prior to the launch of the company's qSearch search tracking and reporting system, search activity was typically measured using counts of "unique visitors" to search engines sites, or from data reported by search providers themselves. By contrast, qSearch uses data from comScore's Global Network, which continuously captures the complete Internet activity, including search engine queries, of a representative cross-section of more than 1.5 million global Internet users at home, work, university and non-U.S. locations. The new data promises to give us a clearer idea of which players are truly the most popular with searchers, by eliminating "false positives" from results reported by the engines, or from traditional "page view" counting techniques. For example, qSearch eliminates automated queries from bots and metasearch engines, as well as the double-counting that occurs when the same query is submitted more than once" (Sullivan, 2003b)

track market share more effectively and to give "a clearer idea of which players are truly the most popular with searchers" (Sullivan, 2003b). Reuters (2016) rank comScore's qSearch is the most widely accepted measure of the web search market competition.

Table 3   ComScore core search entity comparison 2004-2010

| Core Search Entity	Year – US share of searches (%)						
	'04	'05	'06	'07	'08	'09	'10
Google Sites	35	35.1	41.4	56.5	58.5	63	65.4
Yahoo Sites	32	31.8	28.7	23.3	22.2	21	17
MSN Sites	16	16	13.7	11.3	9.8	8.5	11.3
AOL/Time Warner Network/AOL LLC Network	9	9.6	7.9	4.5	4.9	3.9	2.5
Ask Network	2	5.1	5.6	4.5	4.5	3.7	3.8
Excite	4	-	-	-	-	-	-
Others	2	-	-	-	-	-	-

Source: compiled using data from comScore Media Metrix 2004-2010

Overall, the data from 2004 to 2010 illustrate Google's increased dominance of the US search market. The industry is concentrated in terms of majority of market share falling to three key players namely Google, Yahoo and MSN. This is understandable considering the consolidation of the industry through on-going acquisitions and mergers. The table also highlights the growth of MSN's Live Search from its relaunch to MSN Search in 2005 to Bing in 2009. Nielsen reported by August 2009 MSN total searches (including Bing) had increased share to 10.7% with Google at 64.7% (with 7.0 billion searches) and Yahoo at 16%. Although MSN have presented a drop in share from 2006-2009, with the release of Bing in 2009, their market share continued to increase (MSN 2011-13.1% and 2012- 15.2%) surpassing Yahoo by 2012 (Yahoo 2011-16.1% and 2012- 14.1%)[7]. While Google cemented their lead, other players with the exception of MSN have dealt with falling market share.

Despite differences in percentages of market share between ComScore/Net Ratings and WSS/Net Applications, all confer similar market trends. For example, Pollock (2012) provides a comparison of market share across five key market entrants (see Fig 2 below) including Yahoo, MSN, Google, AltaVista and Ask from 2001-2008 in the U.S. market. The figures are predominantly based on Net applications and WSS data sets and illustrate higher market shares percentages than comScore/Net Ratings. Trends are similar in terms of Google's dominance and consolidation of the industry. This is evident as early as 2002 where the two top firms Google and Yahoo accounted for over 70% of market share.

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[7] See appendix 5 for market share chart from 2008-2012 (www.statista.com).

Fig. 2 U.S. Search Engine Market Share 2001-2008
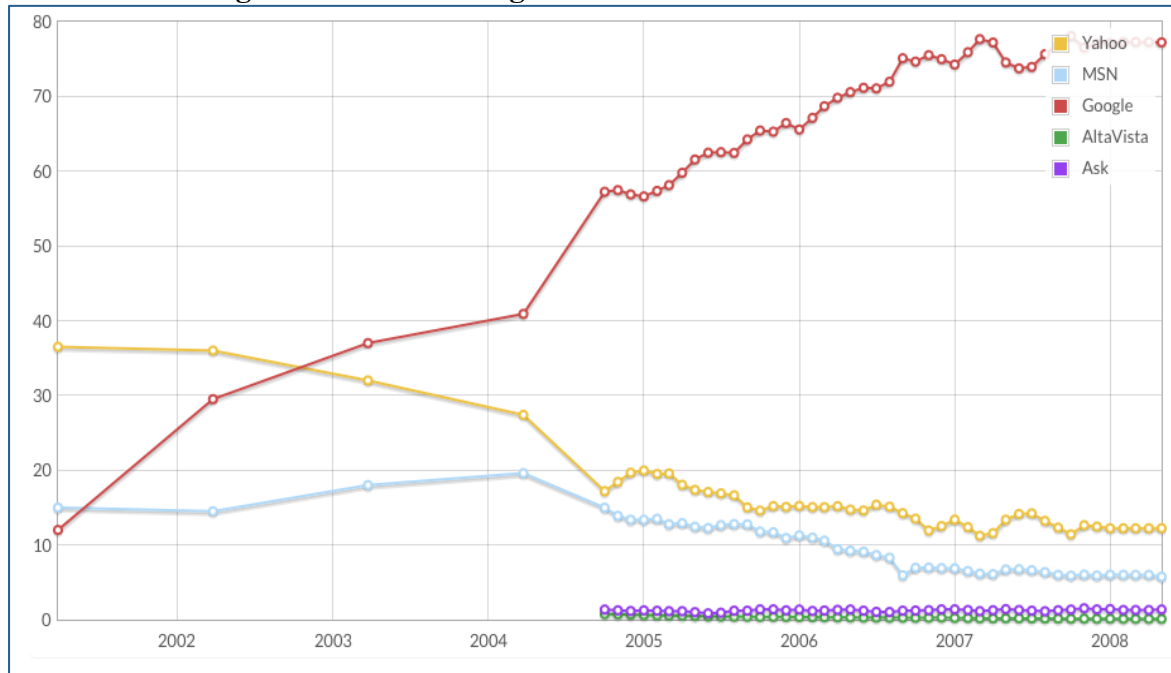
Source: Pollock (2012)

Overall, despite successful first mover entrants, early movers surpassed as high performers in the search engine industry (with the exception of Yahoo) and later movers failed to create a significant impact on market share.

4.3   Strategy differentials in Search Engine Industry

A key finding of the research is that order of market entry alone does not explain performance differentials in the search industry. Key differences arose in how market entrants exploited their market positions or the strategies they had undertaken, once they had entered the search space. This is particularly evident in terms of the product specification and business model strategies uncovered.

4.3.1   Product Specification Strategies

In terms of product specification strategies, search engines had clearly become the dominant category (versus metasearch engines and directories). However, many search engines (such as Excite Lycos and AltaVista) demoted their search technologies to 'loss leaders' status. They reduced investment in developing their search capabilities and focused on creating portals or 'one-stop-shop' services. As a breaking industry, first movers morphed from university-based research projects to Silicon Valley start-ups, therefore, many "kind of made a lot of this up as they went along" and particularly in the early days "there were all throwing different ideas around" (Analyst no. 1). This is in stark contrast to Google's strategy to focus on search as an essential future tool for web navigation. They leveraged their resources to develop their search engine technology and rejected the portal format. Thus they displayed the ability to invest in the 'right' resources. While Google did not create the ideal attributes of speed and relevancy, they recognised them as key to the search

experience, as well as a clean interface and so "they were there for the taking" (Player no. 2). They also learned from first movers, particularly from their mistakes and recognising pain points with incumbent technologies. Search, therefore, became the dominant category of web navigation and Google (with a superior search technology) duly became the dominant design within the category.

4.3.2   Business Model Strategies

In terms of business model strategies, first movers based their learning on traditional broadcasting companies and existing offline models, in the form of banner and interstitial advertising. As traffic emerged as the most valuable resource for web businesses relying on advertising revenues, the first movers faced the challenge of attracting the traffic to their site as a destination in its own right (Rindova and Kotha, 2001). This was a significant shift from directing users to appropriate web content, to retaining and serving the traffic on their destination sites. Again stark contrasts are drawn from the data in terms of Google's monetisation strategy in particular. Google did not monetise until 2000, when they believed that they had found a way to exploit their scale and monetise without disrupting the user experience. Battelle (2005) states that Google had a "perfect storm", as the dotcom bust did not directly affect them as it had first movers. The launch of Adwords came when the "market came back, marketers wanted to spend money where they knew they would get a specific return on investment and Google was poised to be that answer" (Analyst no. 4). Importantly, Google's monetisation strategy using a PPC model scaled with web content. In fact, first movers were essentially 'blind sighted' to market trajectories and assigned resources to develop a 'lock-in' portal model. Google displayed an ability to choose the 'right' business model strategy, in relation to market needs at that time and future market requirements of web search. The PPC model became the dominant category (versus licensing, portal model etc.) and Google attained the dominant design. Overall, it was early movers that displayed an ability to exploit more effectively and to leverage the 'right' resources in comparison to their incumbents. This is demonstrated in terms of learning what not to do in terms of incumbent learning but also 'taking bets' on future technology/market trajectories and assigning resources towards this end. Although first movers clearly displayed "exploitative behaviour" (i.e. creating product specification and business model), there is an overall belief that many first movers "squandered" (Player no. 12) their head start in search.

5.0   Discussion

A number of important discussion points or insights have emerged from the research undertaken.

Firstly, it is clear that speed of entry matters in terms of the emerging search industry. Early entry is found to be more favourable and timing remains crucial in terms of being 'too early' or 'too late' in an emerging market. First movers in search were considered to be 'too early' with high levels of risk and uncertainty, and later movers were considered 'too late' to be able to compete on a par with established players, Google, MSN and Yahoo. This fits with the growing support in the market entry literature for an 'optimal time' of entry as opposed to discrete definitions of first, early and late movers. The optimal time of entry is denoted with the establishment of the dominant category, and before the establishment of the dominant design (Suarez

et al., 2015). In short, it is proposed that the existence of a window of opportunity for firm entry that starts with the emergence of the dominant category and ends with the emergence of the dominant design. Dobrev and Gotsopoulos (2010) describe this optimal time as when a legitimacy vacuum had dissipated and competitive crowding is still low. This potentially allows advantages to be accrued by any entrant that can foresee this 'window'. However, in a breaking industry with frequent environmental shifts the challenge is how market entrants may recognise or foresee this 'window'. While there are inferences to 'prescience' or 'foresight' (Kerin *et al.*, 1992; Baysus *et al.,* 1997), in how firms estimate markets and resource requirements better than others, it is not expanded upon in FMA literature. Arguably such competencies are even more pertinent in the earliest period of industry evolution or the 'fuzzy front end'*,* which is characterised by uncertainty surrounding product specifications, undefined categories, user needs, market boundaries and business models (Aldrich and Fiol, 1994; Santos and Eisenhardt, 2009).

A further insight from this research is that timing alone does not fully explain performance differentials in the search industry. On-going exploitative strategies are required by management post market entry. Within the literature there is an emphasis on the need for first movers to exploit and leverage their head start, prior to competitive entry. First movers are in a unique position in that they occupy a competitor free space, where they must decide how to develop their product for market, and then monetise their offering. First movers may then be 'well positioned' to become the nascent market's cognitive referent or steer the whole market in a particular direction (Santos and Eisenhardt, 2009). However, the decision time is much reduced and 'fraught' with hazards due to the uncertain nature of a high velocity industry, and therefore decision-making errors are ubiquitous (Teece, 2007). In search, first movers based their know-how on existing successful portals such as AOL and MSN and adopted a 'lock in' approach, which did not transfer well to the search space. They were tied to older technologies that ultimately put them at a disadvantage in the market (Fosfuri *et al.*, 2013). Subsequent entrants have the benefit of hindsight and learning. Early entrants particularly Google learned from incumbents and exploited different resources to align with current market needs (a speedy, relevant search tool to navigate the web in line with intent searching needs) and also future trajectories (exponential growth of web content and need for search tool keep pace with this growth). Exploitation strategy intimates an ability to choose the 'right' resource configuration, which is most likely to achieve market acceptance. Alike the recognition of the optimal entry time, there are also inferences in the literature to anticipatory or sensing competencies of entrants in how they exploit their market position (or how entrants estimate markets and resource requirements more effectively than others). However, further research is required of this 'foresight' or sensing capability -how market entrants read the marketplace, which drive different investment decisions and strategies. Again this capability is not explicitly defined or expanded upon in FMA or in the broader market entry literature. Interestingly, Teece (2007) refers to the 'art' of exploiting in terms of designing a product specification and a business model, in which he posits requires 'creativity' and 'insight' as well as knowledge base or learning (p. 1330). Arguably, in an emerging industry key 'inflexion points' (i.e. market and technological advancements) may increase the difficulty for an entrant to foresee resource requirements. While slight adjustments may be enough to sustain exploitation of the current set of opportunities, when the environment changes management need to undertake more substantial reconfiguration

(Helfat *et al.,* 2007). For emerging industries, therefore, prediction and foresight assume a more pertinent role as the product or business model specification may be difficult to envisage for the entrant as well as the customer.

This research proposes further research into such capabilities of market entrants to explain performance differentials in an emerging industry. To date, the literature does not adequately capture such capability requirement, in terms of specifying what they are or their nature. This research proposes the adoption of a dynamic capability perspective (DCV) of first mover concept in order to assist in this endeavour. In terms of attaining and exploiting the 'right' resources, dynamic capabilities relates to how the resource base is changed in a dynamic environment (Ambrosini and Bowman, 2009).

> "Dynamic capabilities are about developing the most adequate resource base. They are future oriented; whereas capabilities are about competing today and they are 'static' if no dynamic capabilities are deployed to alter them" (Ambrosini and Bowman 2009, p. 34)

It is clear from the findings that early entrants such as Google altered their resource base more effectively to fit with the needs and future needs of the market more effectively then other entrants. Possession of such capabilities are, therefore, crucial where an organisation must continually adjust their strategy, organisation, processes, routines etc., in the context of the environment they operate in (Teece 1997, 2007; Eisenhardt and Martin 2000). This is fitting in terms of market entry within a breaking or emerging industry. Adopting such a perspective will consider the nuances of market entrants evolving and reacting to their environment. It is also pertinent that management understand how to recognise the appropriate strategies to employ given the environmental conditions, and what capabilities drive these decisions within the organisation.

In addition to this, given the enduring conceptual and empirical challenges of FMA literature to date and its continued importance in competitive strategy (Klingebiel and Joseph, 2016), there is a need for alternative theories or perspectives. This research posits that the DCV holds strong potential to conceptually enrich FMA theory. As change is a central focus of the dynamic capability perspective it is a fitting perspective as market entrants must embrace change as they interact with a changing environment i.e. pre and post competitive entry. It offers conceptual richness and also a more realistic understanding, where market entry simply does not occur in isolation of its part. The dynamic capability approach is receiving more and more attention (Ambrosini and Bowman 2009). Zahra *et al* (2006) state that the theoretical and practical importance of developing and applying dynamic capabilities to sustain a firm's competitive advantage in complex and volatile external environments has catapulted this issue to the forefront of the research agendas of many scholars' (p. 917).

6.0   Conclusion

A key insight of this research is that first movers need a speedy and proactive approach in attaining entry-timing benefits and exploiting them faster than competitors (Hawk *et al.,* 2013) in emerging industries. There is the risk that first movers may not predict or attain the 'right' resources configuration to exploit market position and to attain competitive advantage. First movers must seize their first mover

opportunity and possess the ability to exploit the 'right' resources. This ability may, however, also fall to other market entrants. There exists, therefore, heterogeneity in the ability of market entrants to exploit or seize their market positions. While this research focuses on a longitudinal case study of the search industry, there is ample opportunity to broaden this to multiple cases of emerging industries (social network space, transportation network space etc.) to compare the capability requirement across different emerging contexts.

Further research must focus on what capabilities enable first or early movers to sense the optimal time to enter and to then exploit timing advantages in emerging industries. FMA literature at this juncture lacks theoretical insights to best guide empirical work and provide valuable guidelines for managers operating in fast-paced environments. This research posits that the DCV offers conceptual richness and pedigree to strengthen the FMA theory. It offers a valuable field to form new conceptual insights to a theory that is "hungry for new ideas" (Zachary *et al* 2015, p. 1405).

References

Ambrosini, V. and Bowman, C. (2009) 'What are abilities and are they a useful construct in strategic management?', *International Journal of Management Reviews*, *11*(1), 29-49.

Bain, J. S. (1956) *Barriers to New Competition*, Cambridge, MA: Harvard Business Press.

Bain, J. S. (1959) *Industrial Organization:* New York: John Wiley.

Barney, J. B. (1986) 'Strategic factor markets: Expectations, luck, and business strategy', *Management Science*, *32*(10), 1231-1241.

Battelle, J. (2005) *The Search: How Google and its rivals rewrote the rules of business and transformed our culture*, Boston: Nicholas Brealey Publishing.

Bayus, B. L., Jain, S., and Rao, A. G. (1997) 'Too little, too early: Introduction timing and new product performance in the personal digital assistant industry', *Journal of Marketing Research*, 34, 50-63.

Bercovici J. (2014) 'The bear case for Uber (yes, there is one)', *Forbes*, 28 July, available: http://www.forbes.com/sites/jeffbercovici/2014/07/28/the-bear-case-for-uber/2/#2d9358fe42d7 (accessed 25th July 2018].

Bolton, L. E. and Heath, C. (2005) 'Believing in First Mover Advantage', *The Wharton School, University Isin Guler. An empirical examination of aggregate patterns of US venture capital decision making*.

Bolton, R. (2001) *The Internet Search Engine Industry*, unpublished thesis (M.Sc.) University of Salford.

Bond, R. S. and Lean, D. F. (1977) *Sales, Promotion and Product Differentiation in Two Prescription Drug Markets*, Report of the Bureau of Economics of the U.S. Federal Trade Commission, Washington, DC: Government Printing Office.

Bosch, A., Bogers, T. and de Kunder, M. (2016) 'Estimating search engine index size variability: a 9 – year longitudinal study', Scientometrics, 107(2), available: http://link.springer.com/article/10.1007/s11192-016-1863-z [accessed 08 May 2016].

Boulding, W. and Christen, M. (2003) 'Sustainable pioneering advantage? Profit implications of market entry order', *Marketing Science, 22*(3), 371-392.

Boulding, W. and Christen, M. (2008). 'Disentangling pioneering cost advantages and disadvantages'. *Marketing Science*, 27: 4, 699–716.

Brown, C. L. and Lattin, J. M. (1994) 'Investigating the relationship between time in market and pioneering advantage', *Management Science, 40*(10), 1361-1369.

Bryman, A. (1997) 'Animating the pioneer versus late entrant debate: An historical case study', *Journal of Management Studies*, 34(3), 415–39.

Cabral, L. M. B. (2008) 'Barriers to Entry', In Durlauf, S. N. and Blume, L. E. ,eds., *The New Palgrave Dictionary of Economics*, 2nd ed., Basingstoke: Palgrave Macmillan.

Camerer, C. F. (1991) 'Does strategy research need game theory?', *Strategic Management Journal*, 12(s2), 137-152.

Carmeli, A. and Markman, G. D. (2011) 'Capture, governance, and resilience: strategy implications from the history of Rome', *Strategic Management Journal*, *32*(3), 322-341.

Caves, R. E. and Porter, M. E. (1977) 'From entry barriers to mobility barriers: Conjectural decisions and contrived deterrence to new competition*', *The Quarterly Journal of Economics*, 241-261.

Chmielewski, D. (2000) 'Bigger and Better: Internet search engines are continuing to evolve', *Chicago Tribune,* 05 June, available: http://articles.chicagotribune.com/2000-06-05/business/0006050091_1_internet-gopher-stanford-university-graduate-students [accessed 12 Sept 2014].

Cho, D. S., Kim, D. J. and Rhee, D. K. (1998) 'Latecomer strategies: evidence from the semiconductor industry in Japan and Korea', *Organization Science*, *9*(4), 489-505.

Cooper, R. G. (1979) 'The dimensions of industrial new product success and failure', *Journal of Marketing,* 43, Summer, 93-103.

Corbin, J. and Strauss, A. (2008). *Basics of Qualitative Research*, 3rd ed., Newbury Park, CA: Sage.

Dobrev, S. D. and Gotsopoulos, A. (2010) 'Legitimacy vacuum, structural imprinting, and the first mover disadvantage' *Academy of Management Journal*, *53*(5), 1153-1174.

Dolbeck, A. (2003) *Search Engine Providers: Dawn of a New Tech Bubble?*, Issue 1251, Weekly Corporate Growth Report.

Easton, G. (2010) 'Critical realism in case study research', *Industrial Marketing Management*, 39(1), 118-128.

Eisenhardt, K. M. and Martin, J. A. (2000) 'Dynamic capabilities: what are they?', *Strategic Management Journal*, *21*(10-11), 1105-1121.

Enderwick, P. (2004) 'First mover advantages and market making expenditures in emerging markets: a conceptual exploration', *Proceedings of the 46th Annual Meeting of Academy of International Business, Stockholm, Sweden*.

Feld, B. (2011) 'What it means to be a `first mover`', *Fortune,* 02 Aug, available: http://fortune.com/2011/08/02/what-it-means-to-be-a-first-mover/, [accessed 25th July 2018].

Fosfuri, A., Lanzolla, G., and Suarez, F. F. (2013). 'Entry-timing strategies: The road ahead'. *Long Range Planning*, 46: 4, 300-311.

Franco, A. M., Sarkar, M. B., Agarwal, R. and Echambadi, R. (2009). 'Swift and smart: The moderating effects of technological capabilities on the market pioneering-firm survival relationship', *Management Science*, 55: 11, 1842-1860.

Golder, P.N. (2000) 'Historical methods in marketing research with new evidence on long-tern market share stability', *Journal of Marketing Research*, 37, May, 152-172.
Golder, P.N. and Tellis, K. (1993) 'Pioneer Advantage: Marketing logic or marketing legend?', *Journal of Marketing Research*, 30(2), 158–170.

Gotsopoulos, A. (2010) Fools Enter Late? Contagious Entry and Firm Survival in Emerging Industries, Sept.

Grant, R. (2016) 'First in, best dressed? The dubious nature of first-mover advantage' available: https://www.marketingmag.com.au/hubs-c/the-dubious-nature-of-first-mover-advantage) [last accessed 25 Feb 2019]

Grehan, M. (2004) 'Search Memories', *Search Engine Watch,* 19 Oct, available: https://searchenginewatch.com/sew/news/2065192/search-memories [accessed 16 Aug 2016].

Grehan, M. (2004) *Search Engine Marketing Audit*, available: http://www.docstoc.com/docs/82117577/Search-Engine-Marketing-Audit [accessed 29 Sept 2014].

Harrison, D. and Easton, G. (2004) 'Temporally embedded case comparison in industrial marketing research', in Fleetwood, S. and Ackroyd, S. *Critical Realist Applications in Organisation and Management Studies*, London and New York: Routledge, 194-210.

Hawk, A., Pacheco-De-Almeida, G. and Yeung, B. (2013) 'Fast-mover advantages: Speed capabilities and entry into the emerging submarket of Atlantic basin LNG', *Strategic Management Journal,* 34(13), 1531-1550.

Helfat, C., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D. and Winter, S. (2007) *Dynamic capabilities: Understanding strategic change in organisations*, Malden: Blackwell Publishing.

Hidding, G. J. and Williams, J. R. (2002) *Historical analysis of first-mover advantage in IT-driven Markets*, Tepper Business School working paper.

Jordan, K. (2002) 'The search engine soap opera', *Search Engine Guide,* 18 Oct, available: http://www.searchengineguide.com/kalena/2002/1018_kj1.html [accessed 21 June 2013].

Kalyanaram G., Robinson, W.T. and Urban, G.L. (1995) 'Order of market entry: Established empirical generalizations, emerging empirical generalizations, and future research', *Marketing Science* 14(3_supplement), G212-G221.

Kalyanaram, G. and Urban, G. L. (1992) 'Dynamic effects of the order of entry on market share, trial penetration and repeat purchases for frequently purchased consumer goods', *Marketing Science*, 11(3), 235–250.

Kerin, R.A., Varadarajan P.R. and Peterson, R. (1992) 'First-mover advantage: A synthesis, conceptual framework and research propositions', *Journal of Marketing*, 56(3), 33–52.

Klepper, S. and Simons, K. L. (2000). 'Dominance by birthright: entry of prior radio producers and competitive ramifications in the US television receiver industry'. *Strategic Management Journal*, 21: 10-11, 997-1016.

Klingebiel, R. and Joseph, J. (2016) 'Entry timing and innovation strategy in feature phones', *Strategic Management Journal,* 37, 1007-1020.

Knowles, M. (2008) 'Short history of early search engines', *The History of SEO,* available: http://www.thehistoryofseo.com/The-Industry/Short_History_of_Early_Search_Engines.aspx [accessed 15 May 2013].
Lambkin, M. (1988) 'Order of Entry and Performance in New Markets', *Strategic Management Journal*, 9(S1), 127–140.

Langley, A. (2008) 'Studying processes in and around organisations', In Buchanan, D., and Bryman A., eds., *The Sage Handbook of Organisational Research Methods*, London: Sage, 409-429.

Lawrence, S. and Giles, C. L. (1998) 'Searching the world wide web', *Science*, 280(5360), 98-100.

Lawrence, S. and Giles, C. L. (1999) 'NetWatch - search engines fall short', *Science*, 285(5426), 295.

Lawson, B. and Samson, D. (2001) 'Developing innovation capability in organisations: A dynamic capabilities approach', *International Journal of Innovation Management*, 5(03), 377-400.

Lean, D.F. (1994) 'First-mover advantages from pioneering new markets-comment', *Review of Industrial Organisation*, 9(1), 177-189.

Liang, T. P., Czaplewski, A. J., Klein, G. and Jiang, J. J. (2009) 'Technical opinion Leveraging first-mover advantages in internet-based consumer services', *Communications of the ACM*, *52*(6), 146-148.

Lieberman, M. B. and Montgomery, D. B. (2013). 'Conundra and progress: research on entry order and performance'. *Long Range Planning*, 46: 4, 312-324.

Lieberman, M.B. (2007) 'Did first-mover advantage survive the dot-com crash?'. *Stanford Strategic Management Conference*, February 28- March 1, Stanford University, California.

Lieberman, M.B. and Montgomery, D.B. (1988) 'First-mover advantages', *Strategic Management Journal*, 9(1), 41–58.

Lieberman, M.B. and Montgomery, D.B. (1998) 'First-mover (dis)advantages: Retrospective and link with the resource-based view', *Strategic Management Journal*, 19(12), 1111–1125.

Lilien, G.L. and Yoon, E. (1990) 'The timing of competitive market entry: An exploratory study of new industrial products', *Management Science*, 36(5), 568–585.

Markides, C. and Sosa, L. (2013) 'Pioneering and first mover advantages: the importance of business models', *Long Range Planning*, *46*(4), 325-334
Markides, C. C., and Geroski, P. A. (2005) *Fast second: How smart companies bypass radical innovation to enter and dominate new markets*, San Francisco: Jossey Bass/Wiley.

Markman, G. D., and Waldron, T. L. (2014). 'Small entrants and large incumbents: A framework of micro entry'. *The Academy of Management Perspectives*, 28: 2, 179-197.

Miles, M. B. and Huberman, A. M. (1994) *Qualitative Data Analysis: An Expanded Sourcebook 2nd Edition*, Thousand Oaks, CA: Sage.

Miller, A., Gartner, W.B. and Wilson, R. (1989) 'Entry order, market share and competitive advantage: A study of their relationship in new corporate ventures', *Journal of Business Venturing*, 59(4), 197–209.

Mitchell, W. (1991) 'Dual clocks: Entry order influences on incumbent and newcomer market share and survival when specialized assets retain their value', *Strategic Management Journal*, *12*(2), 85-100.

Mittal, S. and Swami, S. (2004). 'What factors influence pioneering advantage of companies?'. *Vikalpa*, 29: 3, 15-34.

Montaguti, E., Kuester, S., and Robertson, T.S. (2002) 'Entry strategy for radical product innovations: A conceptual model and propositional inventory', *International Journal of Research in Marketing,* 19(1), 21-42.

Musser, J., O' Reilly, T. and the O' Reilly Radar Team. (2006) 'Web 2.0 Principles and Best Practices', *NewsTech India,* Nov, available: http://www.newstechindia.com/press_file/463_web20_report_excerpt.pdf, [accessed 02 Sep 2016].

Nelson, R. R. and Winter, S. G. (1982) 'The Schumpeterian trade-off revisited', *The American Economic Review*, *72*(1), 114-132.

O' Dwyer, B. (2004) 'Qualitative data analysis: illuminating a process of transforming a `messy` but `attractive` `nuisance`'', In Humphrey, C., and Lee, B., eds., *The Real Life Guide to Accounting Research*. London: Elsevier, 391-407.

Pollock, R. (2012) 'Searchllock engines market share', *Datahub,* 24 Mar, available: https://datahub.io/dataset/search-engines-market-share [accessed 05 May 2016].

Rashtchy, S. and Avilio, J. M. (2003) *The Golden Search – Dynamics of the Online Search Market and The Scope of Opportunity,* March, US Bancorp, Piper Jaffray Report.

Reuters (2016)- 'qSearch', comScore, available: http://www.comscore.com/Products/Audience-Analytics/qSearch [accessed 11 May 2016]

Rindova, V. P. and Kotha, S. (2001) 'Continuous "morphing": Competing through dynamic capabilities, form, and function', *Academy of Management Journal*, *44*(6), 1263-1280.

Rob, R. (1991) 'Learning and capacity expansion under demand uncertainty', *Review of Economic Studies*, 58(4), 655–675.

Robinson, W. T. and Fornell, C. (1985) 'Sources of Market Pioneering Advantages in Consumer Goods Industries', *Journal of Marketing Research*, 22, August, 305–318.

Sandberg, K. D. (2001) 'Rethinking the first-mover advantage', *Harvard Management Update*, 6(5), 1-4.

Santos, F. M. and Eisenhardt, K. M. (2009) 'Constructing markets and shaping boundaries: Entrepreneurial power in nascent fields', *Academy of Management Journal*, *52*(4), 643-671.

Scherer, F. M. (1994) 'First-mover advantages from pioneering new markets: Comment', *Review of Industrial Organisation*, 9, 173-176.

Schmalensee, R. (1982) 'Product Differentiation Advantages of Pioneering Brands', *American Economic Review,* 72, June, 349–365.

Schnaars, S.P. (1986) 'When Entering Growth Markets, Are Pioneers Better Than Poachers?', *Business Horizons*, 29(2), 27–36.

Schneider, G. (2015) *Electronic Commerce*, 11th ed., Stanford USA: CENGAGE Learning.

Schwartz, E. (2014) 'Who's Really Winning The Search War?' Search Engine Land, 24 Oct, available: https://searchengineland.com/whos-really-winning-search-war-204651 [accessed 26 Feb 2018].

Selberg, E., and Etzioni, 0. (1995) 'Multi-service search and comparison using the MetaCrawler', In *Proceedings of the Fourth Int'l WWW Conference,* Boston.

Shamsie, J., Phelps, C. and Kuperman, J. (2004) 'Better late than never: A study of late entrants in household electrical equipment', *Strategic Management Journal*, *25*(1), 69-84.

Short, J.C., Payne, G.T. and Ketchen, D.J. (2008) 'Research on organizational configurations: Past accomplishments and future challenges', *Journal of Management,* 34(6).

Siggelkow, N. (2007) 'Persuasion with case studies', *Academy of Management Journal*, 50(1), 20-24.

Silverman, B. S., Nickerson, J. A. and Freeman, J. (1997) 'Profitability, transactional alignment, and organizational mortality in the US trucking industry', *Strategic Management Journal*, *18*(S1), 31-52.

Snyder, C. (2008) ''Google-killer` Cuil's market share not so hot', *Wired.com*, available: http://www.wired.com/2008/09/google-killer-c/ [12 Jun 2014].

Suarez, F. F. and Lanzolla, G. (2007) 'The role of environmental dynamics in building a first mover advantage theory', *Academy of Management Review*, *32*(2), 377-392.

Suarez, F.F., Grodal, S. and Gotsopoulos, A., (2015) 'Perfect timing? Dominant category, dominant design, and the window of opportunity for firm entry', *Strategic Management Journal*, *36*(3), 437-448.

Sullivan, D. (2003a) 'Microsoft builds itself a search engine', *ClickZ*, 23 Jul, available: http://www.clickz.com/clickz/column/1693898/microsoft-builds-itself-search-engine [accessed 08 Jul 2014]

Sullivan, D. (2003b) 'Where are they now? Search engines we've known and loved', *Search Engine Watch,* 03 Mar, available: http://searchenginewatch.com/article/2064954/Where-Are-They-Now-Search-Engines-Weve-Known-Loved [accessed 13 June 2013].

Sullivan, D. (2005) 'Search engine sizes', *Search Engine Watch,* 28 Jan, available: https://searchenginewatch.com/sew/study/2068075/search-engine-sizes [accessed 24 July 2016].

Sullivan, D. (2008) 'The Google challengers: 2008 edition', *Search Engine Land,* 03 Jan, available: http://searchengineland.com/the-google-challengers-2008-edition-13049 [accessed 29 Sept 2014].

Sullivan, D. (2009) 'Meet Bing, Microsoft's new search engine', *CNET,* 28 May, available: [accessed 12 June 2013].

Sullivan, D. (2013) 'A eulogy for AltaVista, the Google of its time', *Search Engine Land,* 28 June, available: http://searchengineland.com/altavista-eulogy-165366 [accessed 10 April 2015].

Szymanski, D.M., Troy, L.C. and Bharadwaj, S.G. (1995) 'Order of entry and business performance: An empirical synthesis and reexamination', *Journal of Marketing*, 59, October, 17–33.

Teece, D. J. (1986) 'Profiting from technological innovation', *Research Policy*, 15 (6), 285–305.

Teece, D. J. (2007) 'Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance', *Strategic Management Journal*, *28*(13), 1319-1350.

Teece, D. J., Pisano, G., and Shuen, A. (1997) 'Dynamic capabilities and strategic management', *Strategic Management Journal*, *18*(7), 509-533.

Urban G. L. and Star, S. H. (1991) *Advanced Marketing Strategy Phenomenon, Analysis and Decisions*, Englewood Cliffd, NJ: Prentice-Hall, Inc.

Urban, G. L., Carter, T., Gaskin, S. and Mocha, Z. (1986) 'Market share rewards to pioneering brands: an empirical analysis of strategic implications', *Management Science*, 32, June, 645–659.

Vakratsas, D., Rao, R. C. and Kalyanaram, G. (2003) 'An empirical analysis of follower entry timing decisions', *Marketing Letters*, *14*(3), 203-216.

VanderWerf, P. A. and Mahon, J. F. (1997) 'Meta-analysis of the impact of research Methods on Findings of First-Mover Advantage', *Management Science*, 43(11), 1510–1519.

Varadarajan, R., Yadav, M.S and Shankar, V. (2008) 'First mover advantage in an internet-enabled market environment: conceptual framework and propositions', *Journal of the Academy of Marketing Science,* 36(3), 293-308.

Viney, D. (2007a) 'Search engine history - The early years', *EzineArticles.com,* 09 Nov, available: http://ezinearticles.com/?Search-Engine-History---The-Early-Yearsandid=823248 [accessed 16 Mar 2013].

Viney, D. (2007b) 'Search engine history - Web search before Google', *EzineArticles.com*, 09 Nov, available: http://ezinearticles.com/?Search-Engine-History---Web-Search-Before-Googleandid=823256 [accessed 16 Mar 2013].

Viney, D. (2007c) 'Search Engine History- How Google came to dominate', *EzineArticles.com,* 08 Nov, available: http://ezinearticles.com/?Search-Engine-History---How-Google-Came-to-Dominateandid=823264 [accessed 16 Mar 2013].

Wang, C. L. and Ahmed, P.K. (2007) 'Dynamic capabilities: A review and research agenda', *International Journal of Management Reviews*, *9*(1), 31-51.

Wang, Q. and Xie, J. (2014). 'Decomposing Pioneer Survival: Implications for the Order- of-Entry Effect'. *Journal of Product Innovation Management*, *31*: 1, 128-143.

Whitten, I. T. (1979) *Brand Performance in the cigarette industry and the advantage to early entry, 1913–1974*, Washington, DC: Staff Report, U.S. Federal Trade Commission.

Wilkens, U., Menzel, D. and Pawlowsky, P. (2004) 'Inside the black-box: Analysing the generation of core competencies and dynamic capabilities by exploring collective minds. An organisational learning perspective', *Management Revue*, 8-26.

Yin, R. K. (2003) *Case Study Research: Design and Methods,* 3rd ed., Thousand Oaks: Sage.

Zachary, M. A., Gianiodis, P. T., Payne, G. T., and Markman, G. D. (2015). 'Entry Timing: Enduring Lessons and Future Directions'. *Journal of Management*, *41*: 5, 1388-1415.

Zahra, S. A., Sapienza, H. J. and Davidson, P. (2006) Entrepreneurship and dynamic capabilities: a review, model and research agenda , *Journal of Management Studies*, *43*(4), 917-955.

Zhao, Y.L., Erekson, O.H., Wang, T. and Song, M. (2012) 'Pioneering advantages and entrepreneurs' first-mover decisions: An empirical investigation for the United States and China', *Journal of Product Innovation Management,* 29(1), 190-210.
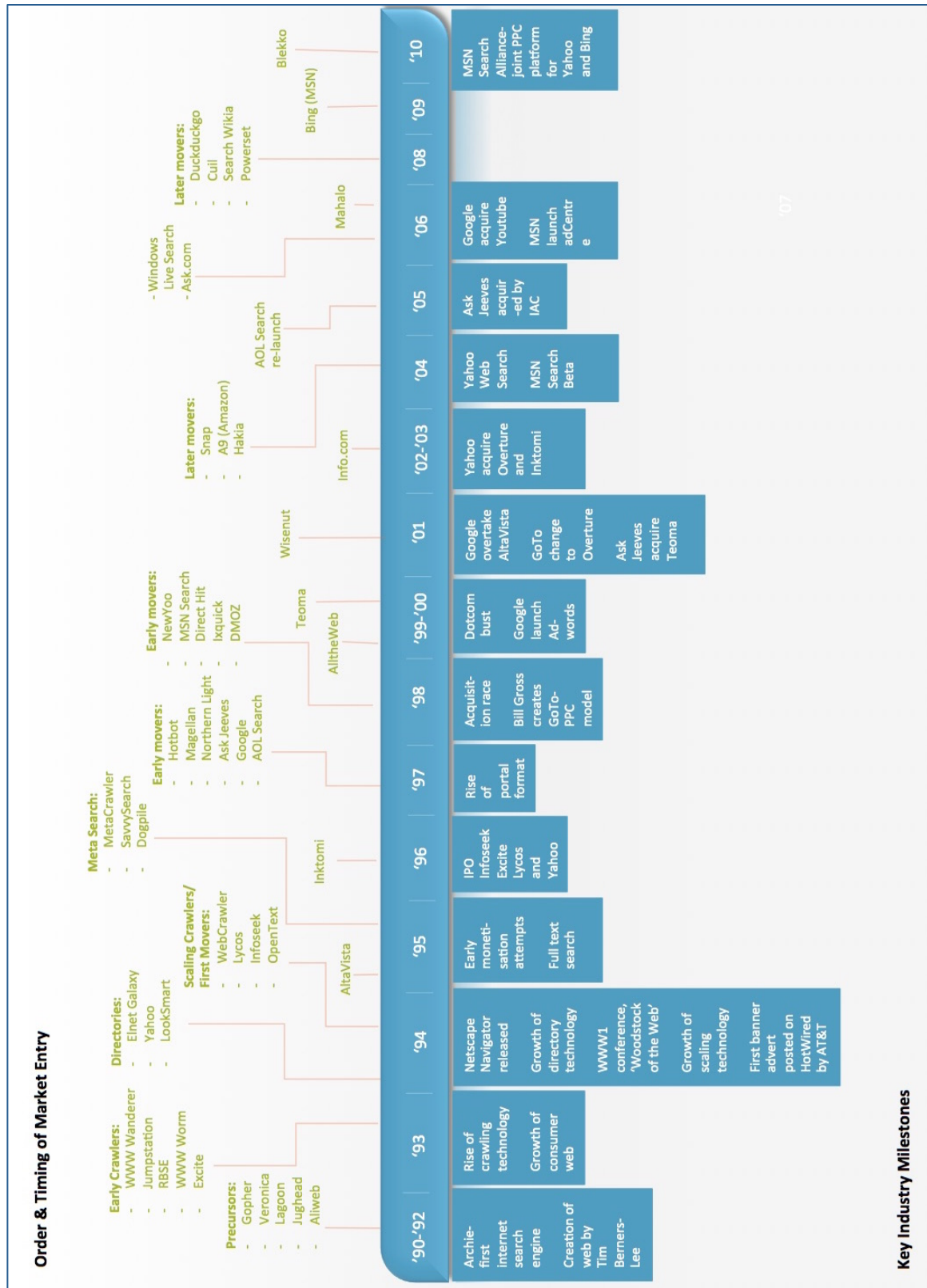
Appendices

Appendix 1: Respondent profiles

Analyst/Player	Interview type	Duration (mins)	Current Org/Role	Past Organisations & Roles /Connections
Player 1	Face-to-face, SES London	12.5	Webloyalty - Managing Director Europe	Yahoo Search Marketing -VP, Sales and Marketing, Europe. Overture- VP and Managing Director, Northern Europe
Player 2	Face-to-face, SES London	15	UK Head of Digital Strategy at Havas Media	MSN - Search Business Manager UK. AskJeeves - Head of Business Development.
Player 3	Face-to-face, SES London	40	Immediate Media - Director of Product Development and Strategy	AskJeeves- Director of Product and Vice President for European Products
Analyst 1	Face-to-face, SES London	37.5	Digital Strategy Consulting- Digital Strategy Director	Jupiter Research (now Forrester Research) European Online Marketing Analyst. Razorfish (digital creative agency)
Analyst 2	Face-to-face, SES London	45	Somo- CEO and Founder	The SearchWorks - CEO. Overture- CEO and President of Overture Europe. GoTo - Founder and CEO.
Analyst 3	Telephone	50.26	Search Engine Land - Executive Editor. SearchWise LLC- President and Founder. Third Door Media- Partner. Author - 'Google Power' & 'The Invisible Web'.	SearchEngineWatch- Executive Editor.Search Engine Strategies - Conference Chair of the international events.
Analyst 4	Telephone	32	Federated Media- Executive Chair and Founder. Web 2.0 conferences - Executive Producer and Co-Founder.	Standard Media International - Founder, Chairman, and CEO. The Industry Standard and TheStandard.com- Founder and Publisher. Wired magazine and Wired Ventures - co-founding editor. Author - 'The Search' (indepth knowledge of Google and search industry).
Analyst 5	Email	–	Incisive Media- VP and Global Content Director. Search Engine Watch and ClickZ - Vice President & Global Content Director. SES international conference series- Producer. SEMPRO- Board of Directors & President.	Global KDM Officer of Acronym Media. Search marketing consultant with a number of international agencies. Recognized as a leading search marketing expert, he came online in 1995 and is author of numerous books and white papers on the subject. He is also chair of the SES Global Advisory Board.
Analyst 6	Telephone	18.43	MediaBank- CEO. Convertro - Advisory Board. Microsoft Digital Advertising Solutions- Advisory Board. Google -Search engine marketing council board. DMA IMAB (Interactive Marketing Advisory Board)- Board Member.	Yahoo- GM,Platforms & Global Exchange. Right Media- President. Did-it- CEO. DoubleClick Media-Vice President. MaxOnline- Chief Executive Officer. Ask.com - SVP, Products & Strategy.
Analyst 7	Telephone	64.5	Angel and Advisor with companies focused on consumer, media and technology innovations. Board - Investmentyogi.com (India), Wings Learning Center, Village Enterprise, and AARP Global Network. Advisory boards of Qwiki.com, Early Bird Alert, Ryalinx, and Search Engine Marketing Professional Organization (SEMPO).	Piper Jaffray and Company- Managing Director, Senior Research Analyst focused on Internet media and marketing, and the Lead China analyst. Worked closely with Yahoo, MSN and Google as advisor and analyst.
Player 4	Telephone	65.35	Proximic- Chief Scientist. Fotopedia- Technical Advisor. Five Apes- Investor and Technical Advisor.	Cuill- VP of Products. Google- Member of Technical Staff. eBay - eBay Fellow, Director of the Advanced Technology Group. AltaVista- CTO and Founder. DEC- Research Staff.
Player 5	Telephone	77.45	Retired. Conversive, Inc- Board Member. Carnegie Mellon University- Adjunct Research Computer Scientist at Language Technology Institute of the School of Computer Science.	Lycos- Founder and Chief Scientist (developed while working on Informedia Digital Library project at Carnegie Mellon University). Texas Instruments- Software Engineer
Player 6	Telephone	25.43	Highland Capital Partners- General Partner.	Lycos- Founder, President and CEO. Terra Lycos- CEO. Board -Going (acquired by AOL), Quigo (acquired by AOL).

Player 7	Telephone	29.27	Microsoft - Yahoo Integration Manager	Microsoft- Group Manager. Microsoft- IT Manager.
Analyst 8	Telephone	83.1	SEO-PR- President and Co-founder. Search Engine Watch- correspondent and frequent speaker at industry conferences.	WebCT- Vice President of Marketing. Backbone Media- Vice President and Chief Marketing Officer. Ziff-Davis- Director of Corporate Communications. Yahoo! and Ziff-Davis venture - launch Yahoo! Internet Life magazine and Yahoo! Europe Yahoo! and Ziff-Davis. Lotus Development Corp- Director of Corporate Communications.
Player 8	Face-to-face, Dublin	46.04	Google - CEO Google Ireland Operations	Vice President, Large Customer Sales, EMEA. Google - Senior Director Large Customer Sales EMEA; Google Ireland Ltd. - Board of Directors. Google - Senior Director Online Sales.
Analyst 9	Email	–	Google- Developer Advocate. Industry blogger and prolific industry speaker.	Microsoft- Director of Business Development and startup evangelist. expert panelist at all three TechCrunch50 conferences. AltaVista- Director of Engineering. DEC- database group. Leadership role at five start-ups including Forte Software, AltaVista, Napster, Bowstreet, and Groove Networks.
Player 9	Skype	33.54	Stalworthy Computing- Director and Senior Software Development Engineer. Lucid Imagination - Consultant.	Microsoft- Senior Software Development Engineer. Excite@Home - Software Architect. Excite- Software Architect. WebCrawler/AOL - Senior Software Engineer. Aliweb and Archieplex- Founder and Creator.
Player 10	Telephone	10.08	OneID - Founder and CTO.	Propel Software- CEO. Abaca Technology- CEO. Infoseek- Chairman and Founder. Serial entrepreneur- Frame Technology, Mouse Systems etc.
Player 11	Skype	43.54	Blekko, CEO and Co-founder -	Topix- Co-founder & former CEO. NewHoo- Co-founder & CEO. Open Directory Project- Founder, Netscape Search- Director of Engineering, Search. AOL- Director of Engineering, Search. Sun Microsystems- Engineering Manager.
Player 12	Skype	59.38	CTO All Voices	Founder of Ask Jeeves,, David was co-founder of Ask Jeeves (Ask.com). He revolutionized online search and marketing while at Ask Jeeves and helped lead the company through its IPO in 1999 (then was acquired by InterActive Corp..CTO on many technology start-ups.
Analyst 10	Email	–	Analyst and blogger on Google since 2003	Web devloper and programmer
Player 13	Face-to-face, Dublin	44.07	Director of Customer Acu, Director Global SME Customer Acquisitions, Google	EMEA Director, Google, DELL
Player 14	Email	–	Analyst and blogger and founder of Geeky Venture	ex-Microsoft- Live Labs (worked under Gary Flake)
Player 15	Email	–	Fortis Solutions Group, New Business Devlopment Color Craft Company,	Northern Light, CEO, founder and CEO of Spinnaker Software Corporation
Player 16	Skype	51.02	Director, Informatics Subprogram and School of Library and Information Science University of Iowa	Founder and Director of Research and Development for the NASA-funded Repository Based Software Engineering project (RBSE)

Appendix 2: Order of market entry and milestones of search engine industry

Order & Timing of Market Entry

Precursors:
- Gopher
- Veronica
- Lagoon
- Jughead
- Aliweb

Early Crawlers:
- WWW Wanderer
- Jumpstation
- RBSE
- WWW Worm
- Excite

Directories:
- Elnet Galaxy
- Yahoo
- LookSmart

Scaling Crawlers/First Movers:
- WebCrawler
- Lycos
- Infoseek
- OpenText

Meta Search:
- MetaCrawler
- SavvySearch
- Dogpile

Early movers:
- Hotbot
- Magellan
- Northern Light
- Ask Jeeves
- Google
- AOL Search

Early movers:
- NewYoo
- MSN Search
- Direct Hit
- Ixquick
- DMOZ

Later movers:
- Snap
- A9 (Amazon)
- Hakia

Later movers:
- Windows Live Search
- Ask.com

Later movers:
- Duckduckgo
- Cuil
- Search Wikia
- Powerset

AltaVista — Inktomi — AlltheWeb — Teoma — Wisenut — Info.com — AOL Search re-launch — Mahalo — Bing (MSN) — Blekko

Key Industry Milestones

	'90-'92	'93	'94	'95	'96	'97	'98	'99-'00	'01	'02-'03	'04	'05	'06	'08	'09	'10
	Archie-first internet search engine	Rise of crawling technology	Netscape Navigator released	Early monetisation attempts	IPO Infoseek Excite Lycos and Yahoo	Rise of portal format	Acquisition race	Dotcom bust	Google overtake AltaVista	Yahoo acquire Overture and Inktomi	Yahoo Web Search	Ask Jeeves acquir-ed by IAC	Google acquire Youtube			MSN Search Alliance-joint PPC platform for Yahoo and Bing
	Creation of web by Tim Berners-Lee	Growth of consumer web	Growth of directory technology	Full text search			Bill Gross creates GoTo-PPC model	Google launch Ad-words	GoTo change to Overture		MSN Search Beta		MSN launch adCentre			
			WWW1 conference, 'Woodstock of the Web'						Ask Jeeves acquire Teoma							
			Growth of scaling technology													
			First banner advert posted on HotWired by AT&T													

Appendix 3: Search Engine Evolution

Precursor technologies in search
The growth of search is very much correlated with the growth of the web. Precursors or early web engines referred to in the data are in fact technologies that never reached a mainstream audience or commercialisation. They were also considered to be standalone academic technologies and did not consist of all the aspects of a search engine in terms of a gathering program, a database and a retrieval program for user queries. These include Veronica, Aliweb, Archie and Jumpstation. While they were never commercial entities or did not compete in the market, they were significant in terms of learning. From the data, first movers were influenced by and learned from precursor information retrieval (IR) technologies (Koster 2011; Mauldin 2011). Although IR technologies indexed the web, they were not fully developed search engines, and so were "versions of that technology" (Hynes 2005). IR methods can be traced back to the 1970s and 1980s where SMART (system for the mechanical analysis and retrieval developed by Gerard Salton at Cornell University), was especially influential and provided the framework for successful web search engines (Croft and Sanderson 2012).

The Web Revolution
The 'web revolution' truly began in 1993 and grew exponentially becoming a medium used by the masses for many purposes (Bagley and Khanna 1997; Marshall 2012). So while first movers learned from precursor technologies, web search was different and posed new challenges for information retrieval technologies beyond traditional IR with smaller, more controlled, non-linked collections (Langville and Meyer 2006). As the capacity for information on the web increased, search engines became crucial in order to navigate and index information in a meaningful manner (Ya-De Wong 2003). As the web grew, however, so did the basic problem of search. Prior to this, the Internet was the domain of academics and technologists and so finding things was a limited problem (Battelle 2005). Grehan (2004) describes the early web as a "chaotic mess" or the "biggest librarian nightmare" (p 5).
In light of this challenge, many university projects began developing technologies in order to navigate and search the web. Search engines played a crucial role in addressing this problem by precompiling a large index of available information to quickly produce a set of possibly relevant documents in response to a query (Knoblock 1997). Web search as we know it today began to emerge in the guise of early search engines such as Lycos, Excite and AltaVista (Ricci *et al*., 2011). It was this generation that advanced search as a widespread consumer commodity. As demand increased, however, bandwidth became an issue for WebCrawler and "at one point, the service became entirely unusable during the daytime hours" (Sonnenreich 1997).

The Rise of the Directories
As the consumer web grew, however, crawlers struggled and became "completely overloaded where you could not get an answer... and under three minutes if you did get one" (Monier 2011). Directories offered an alternative to organising and navigating the web, where web links are categorised into hierarchical categories for the user. The first searchable web directory, Elnet Galaxy (Tradewave Galaxy) launched in January 1994. Other directories followed most notably Yahoo, also in 1994. This was initially a manually complied searchable directory but there were

aspects of the gathering and classification process that were automated. Directories were popular over crawling technologies as they provided a description with each URL. They offered more effective search results to users and even though the web was growing in size, it remained small enough to navigate in this way (Lessen 2012; Skrenta 2012). Yahoo in particular stood out from its early competitors by using humans to catalog the web, where crawler-based results from its partners only kicked in if there were no human-powered matches (Sullivan 2003a). What began as a small online portal created by two electrical engineering graduate students from Stanford – Jerry Yang and David Filo- and developed for a small community of friends, family and Stanford students, became one of the first key Internet brands.

Scaling Crawlers

Among the rise in crawling technologies, AltaVista was a significant entrant. It brought innovations, which many commentators believe, changed the face of search engines forever (Sonnenreich 1997; Battelle 2005). These included a method to store every word of every html page on the Internet in a fast and searchable index and so presented a fast engine with natural language queries. Such was their success that analysts refer to AltaVista as the "the Google of its day" (Sullivan 2003) or "the first Google" (Battelle 2005, p. 48), in that it was the best technology at the time and their entry represented a shift in the industry in terms of speed, reach and popularity with mainstream users. With the success of this generation of crawlers, search engines grew to be the preferred method of navigation over directories (Knowles 2008; Lessen 2012). Also Despite Yahoo's former success, Grehan (2009) states, "the web grew too big for the original human-powered Yahoo index to scale…and to match the exponential growth of the web" (pp. 15- 17). Such was the success of crawlers; directories such as Yahoo formed partnerships and outsourced search functionality, initially with Open Text, AltaVista and then Inktomi (and ultimately Google) (Grehan 2009). Interestingly while Yahoo outsourced for licensed spider search technology, other first movers such as Excite outsourced for in-house editorial staff to review and categorise web sites. In other words competitors were matching each other's performance of the search function (Rindova and Kotha 2001). It was not until 2003 that Yahoo moved from a "partner-driven service" (Battelle 2005, p. 63) to develop their own search strategy. Search had become the dominant category in terms of search navigation tool. As the web expanded, however, user habits changed from 'surfing' or exploration search to intent-based search, therefore, a navigational versus a hierarchical search approach began to make more sense (Battelle 2005). Despite rapid technological innovation in search, it became clear, however, that both early directories and search crawlers were struggling to navigate the web effectively. In his interview Skrenta (2012) attributes the decline of search tools (in terms of relevancy and speed) at this time, to the explosive growth of the web and their inability to scale. In fact, Sullivan (2000) comments that the web referred to, as information highway seemed more like spaghetti junction, where he believed that at this juncture a specialist search tool was needed.

Monetising Search- Portalisation

The unprecedented scale accomplished by the second-generation crawlers, attracted advertisers and the potential to harness the vast amount of users visiting search provider sites.

"It wasn't long after the advent of search engines before advertisers noticed that search engine sites were receiving numbers of hits in orders of magnitude greater than any other type of site on the web. Receiving daily hits in the millions, search engines seemed like advertising gold mines. This realisation prompted the creation of many of the other current search engines" (Sonnenreich 1997)

In tandem with this, Jordan (2002) states that the broader context of the dot-com boom saw many "new search engines develop overnight, driven and funded mainly by profiteers and investors hungry for their piece of the dot-com boom" (p. 1). With investment came pressure to monetise their search service and many start-ups came under scrutiny to display proof points and revenue streams to investors. With the emergence of a business model, several key players such as AltaVista, Lycos and Yahoo transitioned to content providers or more commonly referred to as portals in the latter half of the '90s. Graham (2005) recalls that search was not easy to monetise and so companies that started their life as search engines tried to "move away" in order to build a business model (p. 1). The rationale was that the more services they offered, the more scale they built and subsequently the more attractive they were to advertisers. It was also driven by the need to create a business model and to build a user base to integrate with their advertising model. Portals acquired other services or start-ups in order to provide a "one stop shop" of services for users (Battelle 2005). Search engines had ultimately evolved into conglomerations of sites offering a full range of web-based functions (Green *et al.,* 1998; Swartz 1999). This attracted other online content providers such as AOL and MSN to enter the search market, acquiring or partnering with other search engines in place of developing their own technology. What ensued was an acquisitions race or what Battelle (2005) refers to as the "portal wars" (p. 56) or Macklin (2005) as the "great search scrum of 1998" (p. 9). In this effort search engines were essentially buying market share.

Google's Market Entry
It is evident from the interviews and documentary evidence that Google's entry in itself is considered a "defining moment" (Sherman 2005, p. 1) in search. Macklin attributes this, amongst other things, to the fact that following their entry "search came back to the forefront" (Macklin 2005). In 1996 two PhD students, Sergey Brin and Larry Page, at Stanford University built a large-scale search engine and began to address problems with existing systems in search. The key feature of Google in order to "produce high precision results" was the "link structure of the web to calculate a quality ranking for each web page and utilize link to improve search results" (Brin and Page 1998, p. 3)[8]. This signified a move away from the emphasis on reach and scale as the key attributes of search and also on information retrieval (IR) technologies influence. Google's idea was essentially based on the academic citation model[9] and acted as a quality control mechanism. Although initially "gaining buzz"

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[8] There are varying opinions on whether Google's idea was completely novel or based in part on another paper that was written at the same time (Grehan 2009). At this time computer scientist Jon Kleinberg had similarly proposed incorporating network theory and citation analysis into a ranking algorithm (Battelle Media 2004).
[9] Diaz (2008) explains the academic citation model, where a paper is generally viewed to be important if many other papers cite it and that paper is perhaps viewed as even more important if highly cited works cites it.

within Stanford and "the cloistered world of academic web research" (Battelle 2005, p. 81), by late 1998 Google had increased in popularity and was serving more than ten thousand queries a day. Following venture capital funding from both Sequoia Capital and Kleiner Perkins Caulfield and Byers, Google continued to improve their search technology and formed Google Inc. in 1998. Sullivan (2013) believes that Google started picking up more adoption because the results were so much better and it put the investment into wanting to be a search engine, rather than following a portal strategy or concentrating on monetisation.

> "Now, Google wasn't just a bit better. It was a whole different league of usefulness. A bit like a normal screwdriver vs. a powered screwdriver and now imagine someone starts cluttering your normal screwdriver with little ads" (Lessen 2012)

Battelle (2005) recalls that Google lacked a "viable plan for making money until early 2001" (p. 92) and this was largely in line with the general vacuum of a business model in search at this time. It was not until 1998 that a web-based solution to monetise search was conceived.

PPC model- return to search
From his interview Sherman (2005) recalls that as the user base expanded exponentially and the economic models began to get clearer, it was then when the real opportunities began to emerge in search. Bill Gross in 1998 conceived one such opportunity. As Google continued to develop its technology and companies such as Yahoo and Excite concentrated on a portal strategy, Bill Gross[10] developed what he thought would "unlock the economic value of the search technology" (Rashtchy and Avilio 2003, p. 9). Gross introduced a performance-based model or a paid search concept (PPC) model[11]. Search was monetised in differentiating between 'good traffic', which converted into paying customers and 'undifferentiated traffic', where users can come to a site because of spam, bad portal real estate deals or poor search engine results (Battelle 2005, p. 104). Rashtchy and Avilio (2003) compare this unique auction approach to that of a dedicated "web yellow pages" (p. 9), in which merchants are listed based on what they are willing to pay, therefore the markets decide on the value of each listing. Importantly it offered a web-based solution to monetisation as opposed to previous models such as banner advertising (Monier 2011; Hynes 2005) and subsequently the first sustainable business model. In addition to this, it did not disturb the search experience for the user, in contrast to incumbents' banner adverts. This provided a seemingly 'win-win' situation, as the search company gains revenue as only the relevant sites are ranked highly on a particular search query and so users will continue to use their site, as they are happy with relevant results

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[10] GoTo was conceptualised by Bill Gross in his 1998 at Idealab, a business incubation centre for start-ups, which was also set up also by Gross in 1996.
[11] Dolbeck (2003) describes how the model works- "Advertisers bid for specific words or phrases they want to associate with their ads. When an Internet search includes these terms, the company's ads appear along with the search results. Higher bidders receive more prominent placement. Advertisers pay the amount they bid each time someone clicks on their ad. It's a great deal for the advertising company because the ads are presented to a targeted audience and the company only pays when the Internet surfers actually respond to their ads" (Dolbeck 2003, p. 2)

(Macklin 2005). As more users click on the top relevant sites, the search company earns more revenue (Hynes 2005).

Google recognised the potential of the GoTo model. Moritz (as cited in Battelle 2005) recalls that "Brin and Page very adroitly and cleverly fastened on the proposition offered by GoTo and had Google not adopted some of the advertising techniques that were working for others, it would have ended up a small, but nice, high-end company" (p. 125). Based on the GoTo technology, the Adwords service was launched by Google in 2000 and offered an auction model but separated advertising results from natural search results. Warthen (2012) believes the key differentiator was that Adwords was more automated, efficient and scientifically valid with an engineered manner than GoTo's model.

Google- market leaders
Graham (2005) recollects that gradually portals such as Yahoo "started moving back into search" (p. 1), where a clear monetisation route now existed with minimal disruption to the user. This also presented Google and Overture (formerly GoTo) the opportunity to become key suppliers of paid listings to the other players including Yahoo, MSN, AOL, Lycos, AltaVista and Ask Jeeves (Rashtchy and Avilio 2003).

Once market leader, AltaVista, dramatically lost market share to Google over a six-month period in 2001. Sullivan (2004) recalls that Google sucked in AltaVista traffic as well as traffic from others in what he refers to as the Google-AltaVista X, because of the way the traffic lines cross via the December 2000-May 2001 in Media Metrix figures (see appendix 17 for the Google-AltaVista X diagram) and so it illustrates Google's "metroic" rise in market share (Eichmann 2012).
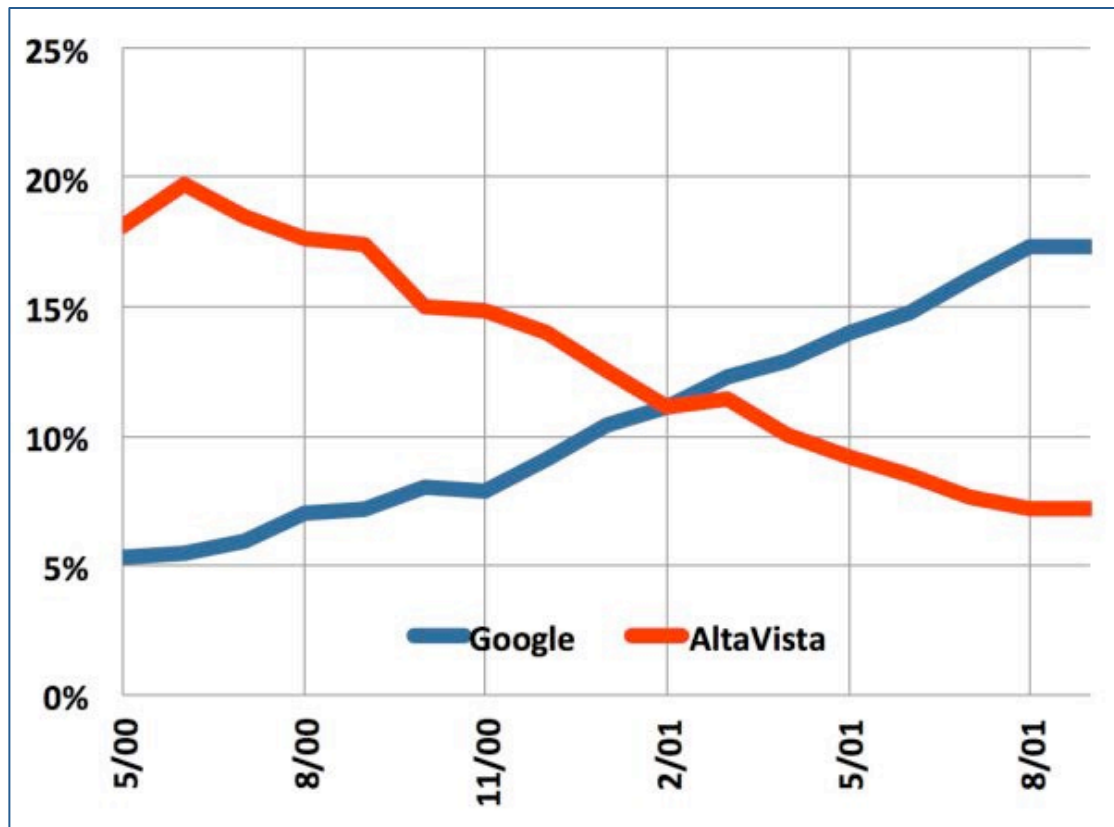
Search post-Google
New market entries in search slowed considerably following Google's entry and the development of the paid search model. This is understandable as to enter and compete in search; start-ups require heavy investment to fund what is in essence a capital-intensive technology (Battelle 2005). There have been several attempts by nascent companies to compete on a par with Google. Start-ups such as like Hakia, Mahalo, Search Wikia, Gigaweb and Exalead etc. have all failed to "make a dent" (Sullivan 2008a) on Google's market share, much like established players Yahoo, Microsoft or Ask.com. A notable and much anticipated later entrant was Monier's search engine Cuil in 2008 (including former Googler's Anna Patterson and Russell Power and Stanford's Tom Costello). Commentators questioned whether Cuil could "be the next Google" with their claims to index 120 billion pages indexed as opposed to 40 billion of Google and also claimed to be three times the speed of Google search (Needleman 2008). From his interview, Monier (2011) recalls that Google was difficult to replicate:

> "…the basic idea was sound. You know the idea was to try to build a larger... it was a different Internet technology, it was trying to create am...you know a larger index than Google am...with a number of features that would make it look different. So they...they were a good bunch of goals at the beginning am. I am not sure what went bad, I think...even to me today it is still a strange story. I don't think it could have been successful on its own am...because it would be very hard to replicate Google but I think it could have been bought by someone for a lot of money" (Monier 2011)
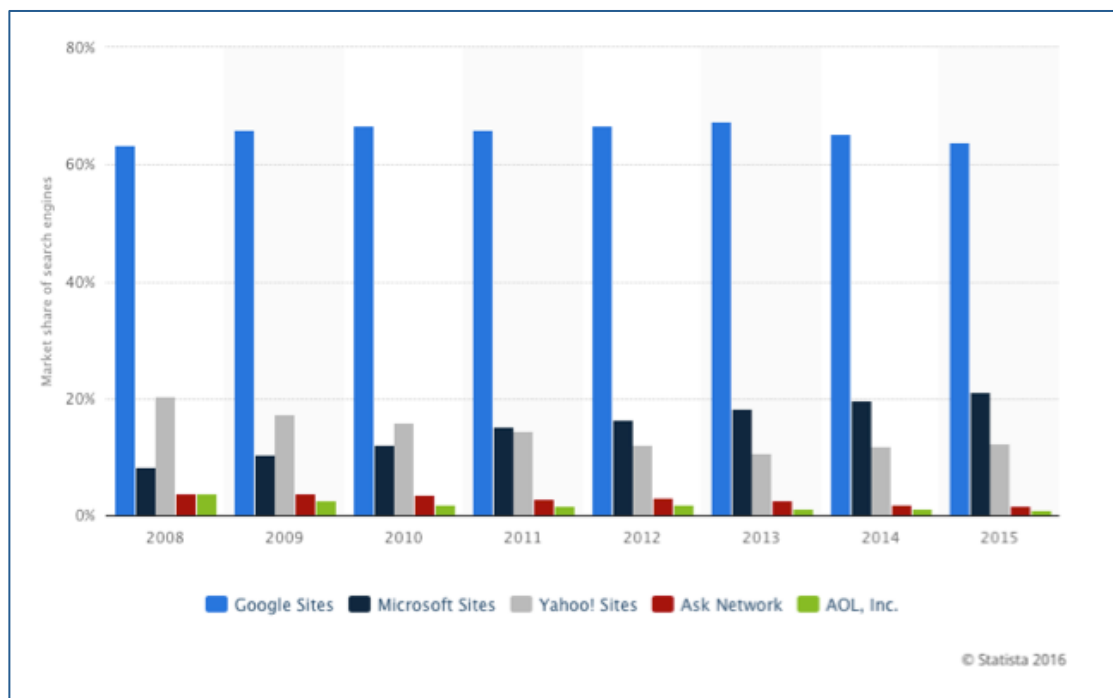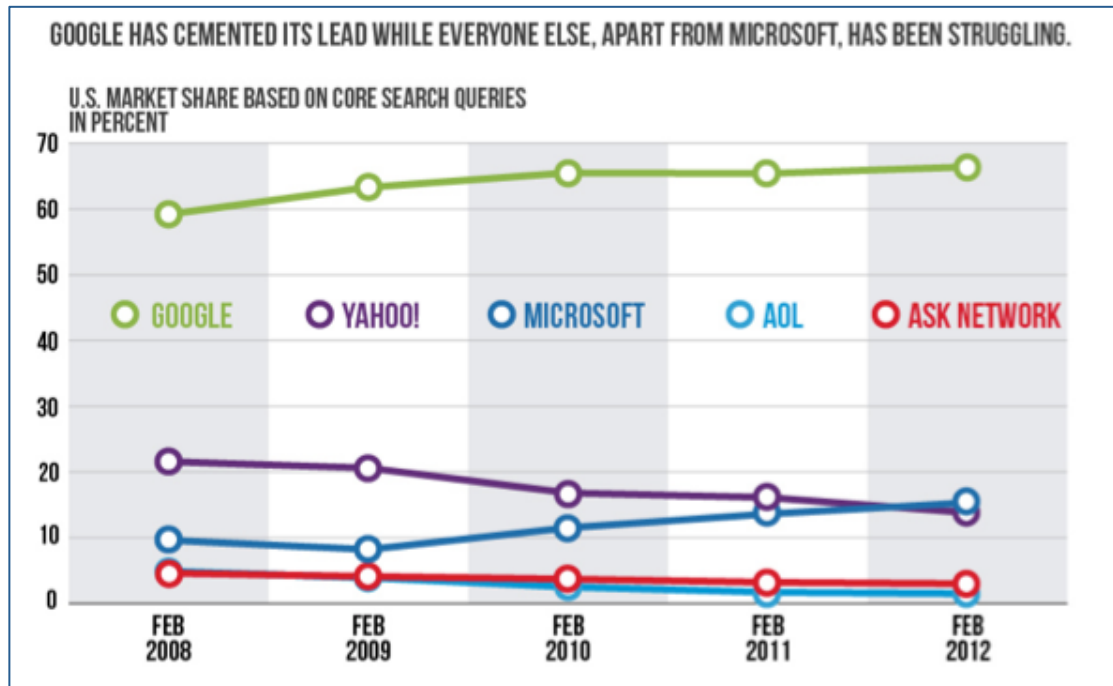
There has been modest success in terms of niche search players such as Ask Jeeves who positioned as a community search (Warthen 2012), where they acquired Teoma in 2001, which created subject-specific communities to search. Blekko was launched in 2010 to combat spam results as its point of differentiation to Google (Skrenta 2012). Late mover, Ixquick, launched in 2004 is a meta-search engine where the key differentiator is that they do not track what the user is looking for. Many late nichers failed to impact, however, and were acquired by incumbent players or exited the marketplace.

Appendix 4: The Google –AltaVista X diagram

Source: Search Engine Land (2013)

Appendix 5   Market share 2008-2012

GOOGLE HAS CEMENTED ITS LEAD WHILE EVERYONE ELSE, APART FROM MICROSOFT, HAS BEEN STRUGGLING.

U.S. MARKET SHARE BASED ON CORE SEARCH QUERIES IN PERCENT

Source: www.statista.com