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Exploring the Influence of CEO Traits on Media Firm Innovation and Performance

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Abstract

A media firm's orientation toward R&D and innovation is largely determined by CEOs who frame market opportunities and drive investments in firm resources. As such, CEO's traits (age, tenure, career background, education) are known to be a predictor of firm R&D spending and attributed levels of innovation and firm performance. This paper explores how CEO traits influence levels of R&D-led innovation expenditure. It concludes that CEO traits had no influence on firm R&D expenditure and that a firm's 'Research Intensity' is primarily influence by their 'cultural orientation toward innovation' and the 'stage of the industry lifecycle' where it is competing.

Keywords: CEO Traits, Media Innovation, R&D Expenditure, Research Intensity, Corporate Financial Performance.

Introduction

Investments in research and development (R&D) are one of the most crucial decisions that senior leadership teams can make in the management of media firms. An extensive body of research indicates that some firms are more 'culturally orientated' toward R&D investments and see it as the key driver in delivering new products and services, which in turn, leads to future competitive advantage and improved market performance (Hurley & Hult, 1998; Han et al, 1998, Ruef, 2002; Langerak et al, 2004; Meyerson, 2016; McKelvey & Saemundsson, 2018; Oliver, 2019; Vizcarrondo, 2022). This firm orientation toward R&D-led innovation is largely determined by media firm CEOs who set the organisational vision, drive investment decisions and strategic action toward innovation. CEOs are known to either lead from the front with a top-down innovation agenda, or, that they create a bottom-up approach by developing an organizational culture that values innovation and embeds it into the DNA of the business through consistent investments in R&D. However, there is a limited knowledge base on how CEO traits influence levels of R&D spending, innovation and firm performance. For example, Barker & Mueller (2002), Brickley (2003), Chen (2013) and Cline & Yore (2016) widely cited research indicates that CEO traits, particularly age, are a 'significant predictor' of relative firm R&D spending, innovation and performance.

This paper contributes to the theoretical development of strategic media management knowledge by extending our understanding of how the CEO traits of media firms influences levels of R&D spending, innovation, and subsequently, firm performance. It will present the principal arguments in literature and will report the findings of primary research, in longitudinal form, which examined the CEO traits and comparative levels of R&D spend and performance for Media Firms, Social Media Firms and the Boston Consulting Group's (BCG) *'Most Innovative Firms'* over the period 2000-2023. As such, this exploratory research will add to a limited knowledge base by presenting empirical research about the traits of CEOs at leading media firms and their on influence R&D investment decisions and strategic action toward innovation.

Literature Review

A media firm's orientation toward R&D led innovation is largely determined by their CEOs who set the organisational vision, drive investment decisions and strategic action toward innovation (Pérez-Latre & Sánchez-Tabernero, 2003; Hensmans, et al, 2013; Reeves et al, 2015; Kung, 2017; Oliver, 2018; Porter & Nohria, 2018). Whilst the role of CEO leader is of paramount importance, previous research indicates that levels of R&D-led innovation are based on an assessment of 'risk' and that leadership teams often evaluate risk alternatives that range from having a 'certain outcome' to 'taking a gamble'. Interestingly, Denrell (2008) and Kung (2017) argued that some leaders were better able to frame market opportunities, evaluate risk and make subsequent investments in firm resources more effectively than others.

In broad terms, the background theory indicates that a firm's R&D expenditure is primarily influenced by issues such as: country norms (eg. Das, 2020); industry norms (eg. Hirschey et al, 2012); and corporate strategy (eg. Guo, 2018). Furthermore, at an organizational level, CEOs are known to either lead from the front with a top-down innovation agenda, or,

that they create a bottom-up approach by developing an organizational culture that values innovation and embedding it into the DNA of the business through consistent investments in R&D. Either way, to be successful with this approach, a CEO needs to be committed to backing innovation-led growth strategies from both internal sources and external ecosystems (Chapman Wood, 2007; Skarzynski et al, 2014). Reeves et al (2022) longitudinal study of 7,000 CEOs worldwide, over the period 1985-2018, examined the role that these senior executives had on firm performance across a range of firms in different industries. Interestingly, their findings contradicted many of the findings in academic literature by concluding that CEO traits had no impact on 'average' firm performance and that the 'CEO effect' tended to decline with larger firms compared to smaller firms. Having said that, a limited academic knowledge base indicates that CEO traits are a 'significant predictor' of relative firm R&D expenditure, innovation and performance (Barker & Mueller, 2002; Brickley, 2003; Chen, 2013; and Cline & Yore, 2016). The most prominent argument from this body of knowledge suggests that CEO age appears to be a significant factor influencing R&D spending with length of tenure, career background and education acting as secondary contributing attributes. Whilst older CEOs have a wealth of industry experience, research indicates that they tend to be risk averse, less likely to invest in R&D, and importantly, their cognitive ability declines meaning that their capacity to assess new market opportunities and emerging technologies diminishes.

Four CEO traits that influence R&D expenditure

The focal theory on the influence of CEO traits on levels of R&D expenditure, innovation and firm performance is limited, but it does indicate that some executives are better able to frame market opportunities, evaluate risk and make subsequent investments in resources more effectively than others. Kung's (2024, p.198) extensive review of 'leadership trait theory' was framed in the context of the media industry and organizational strategy and concluded that a "definitive list of leadership traits that applied across all contexts and which could predict

leadership ability has never emerged". Having said that, certain CEO traits such as age, education, career background and tenure have been found to influence a firm's R&D spending, levels of innovation and performance (Barker & Mueller, 2002; Chen, 2013; Cline & Yore, 2016).

CEO age is the most significant predictor of firm innovation. CEO age has the most significant influence on R&D spending and driving innovation in organizations. Essentially, younger CEOs are generally better at perceiving and understanding emerging technologies and trends and are more willing to take risks and adopt more aggressive R&D investment policies than their older CEO counterparts. In addition, though older CEOs have a wealth of industry experience, they are more inclined to reduce exposure to firm risk as they get older, and they are less likely to invest significant levels of R&D expenditure in innovation-based activities. Interestingly, the Boston Consulting Group's (2023) survey of the world's 'Most Innovative Companies' revealed that the average age of CEOs at the top five most innovative companies – Apple, Alphabet, Amazon, Microsoft and Tesla – was 53.4 years. In comparison, the average age of leading media firms – Walt Disney Co., Paramount, Comcast, News Corp, AT&T – was older at 60.2 years. We also see that the average age of CEOs at social media firms – Twitter, Snapchat, Pinterest, LinkedIn and TikTok – was just 32.8 years. Though this evidence is anecdotal, it supports the widely held expectation that the more technologically focused social media firms are led by younger CEOs.

Arguably, older CEOs are less likely to be able to accurately assess the potential of unanticipated market opportunities and emerging technologies. This point is illustrated by Serfling's (2014) longitudinal study that tracked 4,493 CEOs at U.S. firms between 1992-2010 which indicated that firms led by older CEOs were less likely to drive forward strategic initiatives like mergers and alliances, whilst research by Barker & Mueller (2002) and You et al (2020) found that firm R&D expenditure decreased with older CEOs. Furthermore, Cline &

Yore's (2016) research revealed that firm value and performance with CEOs 42 years and under outperformed those with CEOs 68 years and older. Recent research has also found that the average age of newly appointed CEOs in the S&P500 averaged at 55 years, whilst in the Information Technology Sector, which is often portrayed as hiring younger, more technically savvy CEOs, actually had an in-coming age of 56 years, up from 53 years in 2017 (Tonello et al, 2021).

Such research provides an interesting insight into the leadership and performance of firms and raises a number of questions including whether or not older and more experienced leaders can deliver on a role that entails understanding megatrends, anticipating dynamic industry trends, evaluating emerging technology, developing a strategic vision, energizing the organization and driving investment action toward innovation-led competitive advantage. The range of knowledge and skills required at this senior executive level may explain why the likelihood of a CEO leaving a firm is 30 percent higher when their age is over 64 years (Murphy, 1999).

CEO education is an indicator of cognitive ability and futures thinking. The education level of top executives and how it equates to firm performance has been the subject of numerous studies in general management literature for decades (Barker & Mueller, 2002; Lee & Moon, 2016; You et al, 2020). These studies present a range of evidence regarding the effects CEO education on R&D spending, but a number of the studies found that more educated executives demonstrated greater levels of cognitive ability in terms of futures thinking, abstract reasoning, comprehending complex ideas and problem solving, which in turn is likely to produce superior corporate financial returns. CEOs with higher levels of education can more easily make sense of complex information and absorb new ideas, and as a result, they are more receptive and confident in making innovative R&D plans and strategic risk-taking initiatives.

Furthermore, the 'type' of education has an influence on R&D spending and innovation. Indeed, studies have found that CEOs with a science or engineering degree facilitate higher levels of R&D spending in their firms than those with a non-science educational background. Interestingly, those CEOs with an MBA degree have been found to adopt riskier and more aggressive innovation-based strategies that delivered higher levels of firm performance when compared to CEOs with non-MBA degrees (Camelo et al, 2010; King et al, 2016).

CEO career experience influences adoption of R&D-led innovation growth strategies. A CEO's career experience plays an important role in determining their orientation toward an innovation-led growth strategy. Indeed, CEOs with significant career experience in 'output functions' such as sales and marketing, R&D and product development are more market orientated and aim to drive revenue and gain competitive advantage by investing in R&D activities that can deliver new products and services (Brower & Nath, 2018; You et al, 2020). In contrast, CEOs with 'throughput experience' in the form of general management, administration or finance are often appointed with the expectation that they will be able to draw on their generalist experience to manage a range of organizational issues and challenges.

Building on the argument that some CEOs are able to frame new market opportunities better than others, a plausible conclusion is that those with substantive career experience in sales and marketing or R&D are likely to consider innovation as a market gamble worth taking, compared to generalist CEOs who may evaluate innovation through the lens of lower risk exposure and achieving a certain outcome from their R&D investments.

The influence of CEO tenure on firm innovation is inconclusive. The influence of CEO tenure on the level of firm innovation has been extensively examined and yet this body of knowledge presents an inconclusive picture. However, three themes provide constructive guidance on whether or not a CEO has an orientation toward R&D-led growth strategies.

First, in the early stages of tenure, CEOs often spend time gaining 'firm-specific knowledge' at the expense of a range of other organizational activities including innovation-led strategies delivered through R&D investment decisions. In fact, a principal risk for new CEOs is that they may resist taking action too quickly or hesitate to make changes that are extensive enough. The risk is especially high for insiders who are being promoted to the top spot or are taking the reins alongside a strong chairperson. Yet through quick and decisive actions, new CEOs can seize the opportunity to put their company on the right trajectory for strategic innovation success.

Second, as tenure increases, CEOs tend to exert greater power over decision-making and take strategic investment decisions that are underpinned by higher levels of R&D spending, to drive firm performance. Having said that, insider appointments have been found to be hesitant when it came to taking the types of rapid actions that are often associated with the appointment of an outsider CEO (Chen, 2013; Reeves & Candelon, 2022).

Third, that CEOs tend to make fewer changes in strategy as their tenure increases (Grimm & Smith, 1991; Hambrick, 1995). Hambrick & Fukutomi (1991) argued that this lack of change occurs because with each increasing year of tenure CEOs became more strongly committed to implementing their own paradigm for how the organization should be run. Given this description, longer-tenured CEOs may have little interest in pursuing strategies of innovation through higher R&D spending, preferring instead to emphasize stability and efficiency.

In addition, older CEOs understand that their tenure would come to an end sooner rather than later, and as such, they tend to focus on short-term goals and organizational stability rather than on long-term R&D investments that would drive innovation and firm performance. In a study that sampled 206 S&P500 firms, the relationship between CEO tenure, R&D investment, innovation and firm performance was determined by the degree of "dynamism" in the

industries studied (McClelland et al, 2012). It concluded that longer-tenured CEOs working in less dynamic industries had a positive impact on performance, and a negative influence when operating in highly dynamic industries. To illustrate this point further, the global turbulence caused by COVID-19 resulted in unprecedented levels of uncertainty for many S&P500 and Russell 3000 firms that opted for organizational stability by ensuring that CEOs extended their tenure during the pandemic (Tonello et al, 2021).

Positioning this research

This paper contributes to the theoretical development of strategic media management knowledge by extending our understanding of how the traits of CEOs at media firms influences levels of R&D spending, innovation, and subsequently firm performance. It will present empirical data, in longitudinal form, that illustrates the principal arguments broadly in business and management literature and re-interprets these in the context of the media management scholarship. Whilst this journal has published a small number of studies on media firm 'leadership during transformational change' (Pérez-Latre & Sánchez-Tabernero, 2003), 'leadership styles' (Tsourvakas et al, 2007), 'executive board composition' (Soloski, 2015), and 'governance structures' (Shaver, 2011), media firm leadership remains an 'under research area of inquiry the field of media management' (Mierzjewska & Hollifield, 2006; Kung, 2017; 2024). This exploratory research will add to a limited knowledge base by providing a comparative analysis of the traits of CEOs at leading Media Firms, Social Media Firms and the BCG's Most Innovative Firms in terms of R&D expenditure and corporate financial performance.

Methodology

The aim of this research was to explore the influence of CEO traits on levels of media firm innovation and performance. The literature previously discussed indicates that firms which are more 'culturally orientated' toward innovation, tend to make consistent investments in R&D which results in new products and services, which in turn, leads to improved corporate performance. Whilst the level of a media firm's R&D expenditure is known to be influenced by country norms, industry norms and corporate strategy, the most prevalent view in literature is that CEOs have a key role in backing innovation-led growth strategies. As such, this research sought to compare the CEO traits of Media Firms, Social Media Firms and the BCG's Most Innovative Firms to explore whether certain traits had an influence on levels of R&D expenditure, innovation and corporate financial performance.

The research objectives for this study were:

RO1: To analyse levels of R&D expenditure made by CEOs at Media Firms, Social Media Firms and the BCG's Most Innovative Firms in order to assess their Research Intensity.

RO2: To examine whether the level of R&D expenditure made by CEOs at Media Firms, Social Media Firms and the BCG's Most Innovative Firms influenced corporate financial performance.

RO3: To undertake a comparative analysis of CEO traits (age, education, tenure, career background) and their influence on levels of R&D expenditure at Media Firms, Social Media Firms and the BCG's Most Innovative Firms.

Sample

A non-probability, purposive sample of Media Firms, Social Media Firms and the BCG's Most Innovative Firms (2023) were selected on the basis that the required data was obtainable from the S&P Capital IQ financial database. Furthermore, the purposive selection of Media

Firms and Social Media Firms in the sampling frame was biased toward those firms who 'reported' R&D expenditure in their annual 10-K filings. Indeed, many well-known media firms (eg. Charter Communications, Comcast, Fox, Liberty Global, Paramount Global, Walt Disney, Warner Bros. Discovery) did not identify their expenditure on R&D activity in their financial returns over the period of the research. Dionysiou et al, (2023) argued that whilst this approach did not contravene the International Financial Reporting Standards (IFRS) requirements, the level of R&D activity is reported as 'inactive' because a firm believes the expenditure to be so 'immaterial' that it is combined with other intangible assets in financial reporting.

The firms included in the sample are shown in Table 1 below:

[Insert Table 1 near here]

Research method: comparative corporate financial analysis. Corporate financial analysis was used in a longitudinal time series to examine the influence CEOs on levels of R&D expenditure and corporate financial performance. A Comparative Financial Analysis Framework (Ellis & Williams, 1993; Oliver, 2014) was used to measure how an organization is performing against current and past attainment and then benchmarked against other companies in the sample.

Units of Analysis. The analysis of CEO traits was taken from two primary sources. Secondary web-based data sources were used identify age, education and career background, whilst the data on tenure was identified in annual reports and United States Securities and Exchange Commission Form 10-K filings. Given that CEO tenure can begin and end at any time of the year, the CEOs identified in annual filings were used for analysis. Corporate financial data was obtained from S&P Capital IQ and given that the return on investment in R&D is a medium to long-term process, and that the average CEO tenure in the USA is 10.8 years (Tonello, 2021), the data range for the research was 2000-2023. Each of the following units of analysis provided comparative metrics to benchmark the influence of a CEO on a firm's levels of R&D expenditure and corporate financial performance over time.

Market Capitalization. Market Capitalization (MCAP) is a collective measure of the market sentiment of investors on a firm's current and future potential in terms of strategy, growth, investment goals and profitability. An increasing figure suggests that investors believe the company has strong growth potential, while a decreasing one indicates less optimism. Whilst MCAP is not a perfect measure of corporate performance, previous studies have shown a correlation between a high MCAP and corporate performance (Oliver, 2018; You et al, 2020).

Sales Revenue. Sales revenue is a key metric for measuring corporate performance, offering valuable insights into a firm's ability to generate income and attract customers (Oliver, 2018; Oliver & Picard, 2020). Higher revenue translates to greater financial resources for the company, particularly in terms of the opportunity to invest in R&D initiatives.

R&D Expenditure. R&D expenditure is an investment in intangible assets for future innovation. This metric can provide valuable insights into a firm's performance with high spending demonstrating a commitment to innovation and developing new products and services, and improved operational efficiency, contributing to overall financial performance. This metric signals a focus on long-term success, rather than just short-term profits and indicates a firm's intention to remain relevant and adapt to future market changes (Hensmans, et al, 2013; Kung, 2017; Porter & Nohria, 2018).

R&D Intensity. The prevailing view in literature indicates that higher levels of R&D expenditure improves a firm's performance. R&D Intensity is metric which is calculated by dividing a firm's Sales Revenue by R&D Expenditure to derive a percentage figure. This metric has been found to indicate that higher levels of R&D activity in relation to sales revenue is a good measure of long-term corporate performance (Yeh et al, 2010; Serfling, 2014; Chen & Ibhagui, 2019; Alam et al, 2020).

Data Analysis. Descriptive statistics offered a standardized approach to summarize longitudinal data efficiently and objectively, whilst reducing the risk of personal interpretation skewing the analysis. This approach to analysis also had the advantage of identifying trends and comparing the results of different type of firms and their CEOs on levels of R&D expenditure and corporate performance. Of particular relevance to this study the use of descriptive statistics to identify the 'mean' by calculating the sum of all the values in a dataset

and then dividing by the number of values. Finding 'averages' in data was used by Reeves et al (2020) in their extensive study of CEO traits and their influence on R&D investment and corporate performance. As such, the descriptive statistical study of the units of analysis previously identified were considered appropriate to explore the influence of CEO characteristics on media firm innovation and performance.

Construct validity

This research argues that the exploration of CEO traits on media firm innovation and performance is predicated on two fundamental issues that enhances the credibility and trustworthiness of the findings. As such, the methodological approach is considered to be a logical and rational approach (Denzin & Lincoln, 1994; Diko, 2016; Oliver & Picard, 2020) that included: firstly, a close examination of the relevant literature that identified the theoretical and empirical arguments to ascertain the appropriate units of analysis to be selected; secondly, the use of descriptive statistics as a measurement tool to identify 'averages' aligns with the approach established by Reeves et al (2020).

Data Analysis

RO1: To analyse levels of R&D expenditure made by CEOs at Media Firms, Social Media Firms and the BCG's Most Innovative Firms in order to assess their Research Intensity.

Our current understanding of firm investment in R&D indicates that expenditure is affected by country and industry standards (Hirschey et al, 2012; Das, 2020), but in particular, an organisation's culture and corporate strategy which emphasizes the value of innovation-led growth strategies (Hurley & Hult, 1998; Ruef, 2002; Langerak et al, 2004; Meyerson, 2016; Guo, 2018). Given this line of reasoning, it can be argued that a CEOs traits have little influence on a firm's 'Research Intensity'.

The comparative data on Research Intensity, shown in Diagram 1 below, indicates that Social Media Firms have invested heavily in R&D in comparison to Media Firms and the BCGs Most Innovative Firms. Perhaps most surprisingly, Media Firm investment levels are

significantly lower than the other firms in the sample. In order to explore this issue further it is important to remember that a firm's Research Intensity frequently follows an inverted U-shaped curve during the industry lifecycle. Typically, R&D investment is low when a new industry emerges and significantly increases during the growth stage as companies strive to differentiate themselves by developing new or improved products to gain competitive advantage and market share. In the maturity stage, R&D investment stabilizes or even declines slightly as the focus shifts towards refinement and optimization of existing products and services.

The data in this research indicates that Social Media Firms have invested for growth, with the more established firms, Meta and Yelp investing an average 20% of sales revenue in R&D over the period of time being analyzed. Whilst Yelp, Twitter, Snapchat, as emerging platforms have invested an average of 20%, 43% and 73% of sales revenue in R&D respectively. In comparison, the Media Firms' overall average Research Intensity, at 3.38%, is likely to have been governed by the dynamics of a mature industry where structure and performance have been established. The necessity to apportion a large percentage of sales revenue to R&D-led innovation is not a primary driver of competitive success which reflected in the average Research Intensity figures for AT&T (8.9%), Netflix (8.46%), Sony (6.15%), Vivendi SE (1.15%) and the Dish Network (0.28%).

However, the BCG's Most Innovative Firms compete in a range of different industries and so the argument for an 'industry norm' for R&D expenditure is obsolete. With a Research Intensity average of 12.6% over a 23 year period, the argument for these firms being more 'culturally orientated' toward R&D as the key driver in delivering new products and services, competitive advantage and improved market performance is more convincing. With Tesla Inc. (25.90%), Microsoft (14.77%), Alphabet (13.63%) leading the way, even Amazon (8.90%)

Apple (4.70%) have a higher average Research Intensity figure than many of the Media Firms in the sample.

Diagram 1: Comparative Analysis of Average Research Intensity

[Insert Diagram 1 near here]

RO2: To examine whether the level of R&D expenditure made by CEOs at Media Firms, Social Media Firms and the BCG's Most Innovative Firms influenced corporate financial performance.

Whilst we know from previous studies that the 'CEO effect' on firm performance is debatable (Denrell, 2008; Helfat & Peteraf, 2015; Kung, 2017; Reeves et al, 2020) literature reveals a largely polarized discussion. On the one hand, CEOs have been known to drive innovation-led growth strategies that have delivered superior firm performance (Han et al, 1998; Chapman Wood, 2007; Skarzynski et al, 2014), whilst some studies have found that CEOs are often been captured by a corporate culture and dominant logic that favours consistency and deters organizational change (Lorsch, 1986; Mintzberg et al, 2001; Groysberg et al, 2018) or are guided by industry norms (Hirschey et al, 2012).

The findings from this study are inconclusive across all three data sets when examining the level of R&D expenditure made by CEOs and their influence on corporate financial performance. For example, the Research Intensity of CEOs at Media Firms indicated that for AT&T, during CEO Edward E. Whitacre Jr. tenure, R&D spend increased from $78m to $577m (a 640% increase) and a +23% increase in Revenue and a decrease in MCAP of -24%. In comparison, AT&T CEO Randall L. Stephenson's tenure was marked by R&D spend increasing from $985m to $1,276m (a 30% increase) and a +52% increase in Revenue and a decrease in MCAP of -4%. Interestingly, Stephenson's Research Intensity declined by -15% compared to Whitacre Jr. corresponding figure of +375%.

For Social Media Firms the data is similarly inconsistent. For example, during Snapchat CEO Evan Spiegel's tenure, R&D spend increased from $184m to $ 1,933m (a +952%

increase) which resulted in a +1024% increase in Revenue and a decrease in MCAP of -44%. Furthermore, during his tenure, Pinterest CEO Benjamin Silbermann, R&D spend increased from $ 208m to $949m (a 356% increase) which resulted in a +493% increase in Revenue and an increase in MCAP of +12%. Interestingly, Research Intensity decreased -23% during his tenure.

In terms of the BCG's Most Innovative Firms, the data is equally inconsistent. For example, at Microsoft, CEO Steven A. Ballmer's tenure resulted in R&D spend increasing from $3,772m to $10,411m (a +176% increase) and a +239% increase in Revenue and a decrease in MCAP of -19%. However, Research Intensity decreased by -19% during his tenure. Alphabet's CEO, Eric E. Schmidt, tenure resulted in R&D spend increasing from $21m to $5,162m (+24,480% increase) and a + 43,772% increase in Revenue and an increase in MCAP of +269%. However, Research Intensity decreased by -44% during this period.

RO3: To undertake a comparative analysis of CEO traits (age, education, tenure, career background) and their influence on levels of R&D expenditure at Media Firms, Social Media Firms and the BCG's Most Innovative Firms.

Our understanding of the influence of CEO education and career background indicates on levels of R&D expenditure indicates that both variables underpin an orientation toward an innovation-led growth strategy. More educated CEOs executives, and particularly those with a science or engineering degree, exhibit higher levels of cognitive ability and are more confident investing in R&D initiatives than those with a lower level of education and a non-science educational background (Barker & Mueller, 2002; Camelo et al, 2010; Lee & Moon, 2016; King et al, 2016; You et al, 2020). Furthermore, CEOs with significant career experience in sales and marketing, R&D and product development have been found to be more market orientated and invest in R&D activities that can deliver new products and services (You et al, 2020; Brower & Nath, 2018).

Given this knowledge, the data analysis for both CEO education and career background revealed no clear pattern, nor outliers produced by firms in the same data set and across the Media, Social Media and the BCG's Most Innovative Firms on levels of R&D expenditure. For example, in the Media Firm sample, AT&T CEOs, Randall L. Stephenson achieved a Bachelor and Masters degree in Accounting, whilst John T. Stankey gained a Bachelor Business Administration; however, both CEOs produced Research Intensity figures of 0.95% and 0.93% respectively. In the BCG's Most Innovative firms sample, Apple CEOs Steve Jobs, dropped out of college education whilst Tim Cook gained a Bachelor in Science and Master of Business Administration degree; the respective Research Intensity figures were almost the same at 4.67% and 4.99%. Furthermore, for the Social Media Firm sample, Twitter CEOs Jack Dorsey dropped out of his Bachelor degree whilst Parag Agrawal received a Bachelor degree in Computer Science and Engineering and a PhD in Computer Science. Again, the respective Research Intensity figures were similar at 24.59% and 26.84%.

CEO age and Research Intensity

CEO age is known to have a significant influence on firm R&D spending, with younger CEOs better able to understand emerging trends, take risks and adopt more aggressive R&D investment policies than their older CEO counterparts. By comparison, older CEOs tend to reduce exposure to firm risk and invest less in R&D expenditure (Barker & Mueller, 2002; Serfling, 2014; Cline & Yore, 2016; You et al, 2020).

The data analysis for this study did not support the findings of previously published studies. For example, in the Media Firm sample, the four Netflix CEOs over a 23 year period had an average age of 43, 54, 59 and 61 years with corresponding Research Intensity figures of 8.76%, 8.12% 7.49% and 8.46%. In the BCG's Most Innovative Firms sample, three Apple CEOs had an average age of 51, 42 and 59 years with corresponding Research Intensity figures of 13.25%, 14.78% and 14.34%. Furthermore, in the Social Media Firm sample, three Twitter

CEOs had an average age of 49, 42 and 38 years with corresponding Research Intensity figures of 70.03%, 24.59% and 26.84% during their tenures.

However, if the CEO age across the 3 datasets are averaged, there is perhaps some insight that we can gain from the data. The average CEO age of the BCG's Most Innovative Firms is 49.5 years and a Research Intensity of 12.64%; this compares to the Media Firms average CEO age at 55.85 years and a Research Intensity of 3.38%. The average CEO age at Social Media Firms is 37.57 years and a Research Intensity of 40.16%. At face value, the data may indicate that the older Media Firm CEOs have been less likely to invest in R&D initiatives in comparison to their younger counterparts at Social Media Firms who have invested in market growth opportunities during the early stages of the industry lifecycle (see Diagram 2 below).

Diagram 2: Comparative analysis of CEO Average Age and Research Intensity

[Insert Diagram 2 near here]

CEO tenure and Research Intensity

The findings from previous studies on the influence of CEO tenure on the level of firm investment in R&D is inconsistent. Newly appointed CEOs have been found to be hesitant when making long-term R&D investments and that as their tenure increases CEOs tend to make fewer changes in strategy, preferring organizational stability over riskier investment strategies (Grimm & Smith, 1991; Hambrick & Fukutomi, 1991; Hambrick et al., 1999). However, other studies indicated that newly appointed CEOs have been found to make quick and decisive actions implement new innovation-led growth strategies as a way of making an immediate impact that would drive innovation and firm performance (Chen, 2013; Reeves & Candelon, 2022). The findings from this study present a consistent pattern across the three datasets, in so far as, CEO tenure did not appear to influence the level of investment in R&D in Media Firms, Social Media Firms and the BCG's Most Innovative Firms (see Diagram 3 below).

In terms of the Media Firms, Dish Network CEO Charles W. Ergen had the longest tenure of CEOs in this dataset at 15 years. He started his tenure with an average Research Intensity of 0.63% and ended his tenure with three successive years (2008-10) of no investment in R&D; most likely as a result of the Global Financial Crisis. At Netflix, CEO Reed Hastings tenure lasted nine years during which the average Research Intensity at 8.76%, which is comparable to current CEO Ted Sarandos two year tenure where the equivalent figure is 8.46%.

This consistent level of firm investment in R&D is also reflected in the data from the BCG's Most Innovative Firms. For example, at Alphabet, the CEO tenures of Eric E. Schmidt (11 years), Larry Page (7 years) and Sundar Pichai (5 years) produced largely comparable average Research Intensity figures of 13.25%, 14.78% and 14.34%. This finding is equally similar in the data for Apple whose CEO tenures for Steve Jobs (15 years) and Timothy D. Cook (12 years) produced Average Research Intensity figures of 4.67% and 4.99% respectively.

Furthermore, the data for the Social Media Firms present an equally consistent picture. For example, at Twitter, CEOs Jack Dorsey (6 years) and Parag Agrawal (3 years) produced Average Research Intensity figures of 24.59% and 26.84% respectively. It is only at Yelp where the data indicates that Research Intensity has increased during tenure. Here CEO Jeremy Stoppelman's 16 year tenure produced an average Research Intensity figure of 19.28%, however, but investment in R&D rose from 17% of Revenue at the beginning of his tenure to a current level of 26%.

It should also be noted that the undulating trend line for Social Media Firms is explained by the emergence of firms at different points in time (Meta, 2009; Twitter, 2010; Snapchat, 2015 and Pinterest, 2017). As such, the data points don't always follow a perfectly straight line but rather fluctuate around a general upward trend.

Diagram 3: Average Research Intensity (2000-2023)

[Insert Diagram 3 near here]

Conclusions

This paper sought to explore the influence of CEO traits on the level of media firm R&D spending, innovation and corporate financial performance. It presented the key arguments in literature which noted that CEO age, education, career background and tenure are significant predictors of relative firm R&D spending, innovation and performance. As such, the CEO traits and performance of Media Firms were compared with Social Media Firms and the BCG's Most Innovative Firms to identify any comparative trends in the data.

Whilst the literature base on CEO traits and firm innovation and performance is relatively small, the consensus argument was that CEO traits influence levels of R&D spending, innovation and firm performance. However, the findings from this research stand in stark contrast to what we already know from existing literature. Indeed, there was no evidence to suggest that any of the CEO traits examined in this paper had an influence on any of the firms' in the samples R&D expenditure and performance. As such, the findings in this paper support those of Reeves et al (2022) whose wide-ranging research found that the traits of CEOs had no effect on firm performance. Given that the number of studies in this area is relatively small, the difference in findings shouldn't be solely viewed as contradictions. Indeed, they highlight the inherent complexity of drawing conclusions from studies that vary in scale, scope, methodology and data analysis and the need for more research in the form of replication studies.

Having said that, what we can conclude from how this study which explored CEO traits across different firms competing in different industries the research is twofold. Firstly, that a firm's Research Intensity is primarily influence by its *'cultural orientation toward innovation'*, and secondly, the *'stage of the industry lifecycle'* where the firm is competing. In terms of a

'cultural orientation toward innovation' the findings suggest that the BCG's Most Innovative Firms see sustained R&D investments as the key driver in delivering new products and services, competitive advantage and improved market performance. These firms were drawn from a number of industries and so the argument for an 'industry norm' to R&D expenditure is obsolete. This cultural orientation is likely to manifest itself in the form of an organizational tolerance toward risk and failure when evaluating new ideas and technologies; and understanding that the benefits of R&D may not be immediate, but, deliver long-term and sustainable corporate growth. The role of the CEO, therefore, is to communicate the strategic importance of, and champion, R&D initiatives that increase the level of the firm's Research Intensity above other firms in their competitive set. Overall, a culture oriented towards R&D investment fosters a supportive environment where innovation thrives, risks are seen as opportunities, and the long-term vision of the company is prioritized. This lack of a cultural orientation toward R&D may go some way to explaining why so many Media Firms (eg. Charter Communications, Comcast, Fox, Liberty Global, Paramount Global, Walt Disney, Warner Bros. Discovery) did not report R&D expenditure in their annual filings. Whilst this does not contravene International Financial Reporting Standards, it does give the impression that R&D is an inconsequential part of these media firms corporate strategy.

In terms of 'industry lifecycle stage', the findings provide an interesting comparison between Media and Social Media Firms. Firstly, the Media Firms in the sample operate in a mature industry, which in itself presents several limitations that can constrain a company's R&D expenditure. Mature industries are often heavily regulated and characterised by low market growth, established market positions and well-defined products and technologies that cater to current market needs. A media firm's focus tends to be on incremental improvements in products and services from relatively low levels of R&D expenditure. As such, CEOs tend to prioritize short-term financial gains and immediate returns on investment which make it

difficult to justify allocating significant resources towards high-risk, high-reward R&D initiatives with uncertain long-term benefits. In essence, a mature media industry environment imposes limitations on CEOs where specific traits become immaterial and the primary requirement of their tenure is focussed on organizational stability and not innovation.

In contrast Social Media Firms are experiencing early stages of growth and industry development, characterized by both uncertainty and high propensity for innovation. As an emerging industry it lacks established products and technologies, creating a fertile ground for groundbreaking innovation. As such, startups and early-stage companies often rely on venture capital funding where investors are willing to take on higher risks aimed at achieving first-mover advantage, rapid growth and market share in exchange for potentially high returns on their investment. Investing in significant levels of R&D expenditure to discover new solutions vital for survival essential for achieving first-mover advantage and market differentiation.

In terms of the practical implications of this study, whilst existing literature indicates that CEOs play a vital role in determining organisational vision, direction and leading on strategic action toward innovation, the findings of this research indicate that a CEO's traits such as age, education, career experience need to be aligned to the culture of a firm and the industry in which a firm is competing. Given this, executive boards and executive search agencies need to be aware that their existing and incumbent CEO's ability to drive R&D-led innovation growth strategies may be constrained or enhanced by organizational culture and industry norms on Research Intensity that are determined by the stage of an industry's life cycle.

In terms of determining a future direction for research into the influence of CEO traits on media firm R&D-led innovation growth strategies, the primary focus should be on replication studies of the limited number of research studies and their findings. Given that the difference in the results from a range of studies on this topic are contradictory, future media

management researchers should aim to verify and validate the results of previous studies with the intention of ensuring the trustworthiness and robustness of scientific findings. At face value, CEOs play a crucial role determining organisational vision and driving investment decisions and strategic action toward innovation, and yet, the scientific evidence on which this narrative underpinned is ambiguous.

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Table and Diagrams

The firms included in the sample are shown in Table 1 below:

BCG's Most Innovative Firms	S&P Primary Industry Classification	Time Period
Alphabet Inc.	Interactive Media & Services	2004-2023
Amazon Inc.	Broadline Retail	2000-2023
Apple Inc.	Technology Hardware, Storage and Peripherals	2000-2023
Microsoft Corporation	Systems Software	2000-2023
Tesla Inc.	Automobile Manufacturer	2010-2023
Media Firms	**S&P Primary Industry Classification**	**Time Period**
AT&T Inc.	Integrated Telecommunication Services	2000-2023
Dish Network Corp.	Cable & Satellite	2000-2023
Netflix Inc.	Movies & Entertainment	2000-2023
Sony Group Corp.	Consumer Electronics	2000-2023
Vivendi SE	Broadcasting	2000-2023
Social Media Firms	**S&P Primary Industry Classification**	**Time Period**
Meta Platforms Inc.	Interactive Media & Services	2009-2023
Pinterest Inc.	Interactive Media & Services	2017-2023
Snap Inc.	Interactive Media & Services	2015-2023
Twitter Inc.	Interactive Media & Services	2010-2023
Yelp Inc.	Interactive Media & Services	2008-2023

Diagram 1: Comparative Analysis of Average Research Intensity

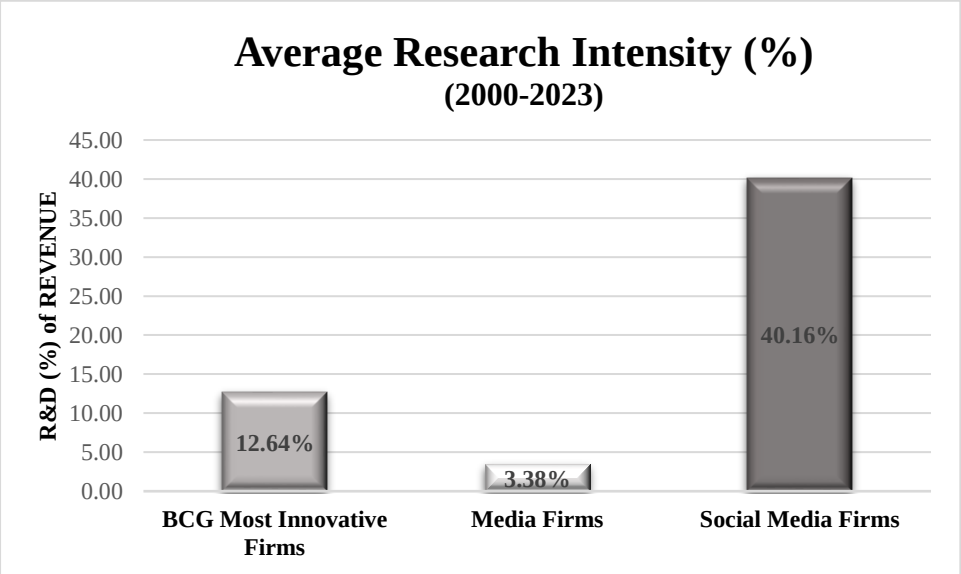

Diagram 2: Comparative analysis of CEO Average Age and Research Intensity

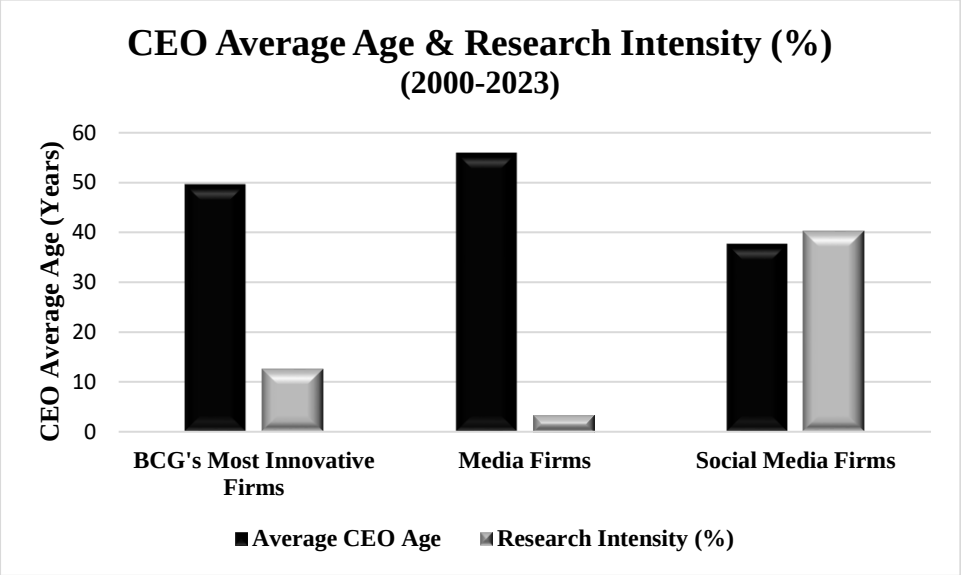

Diagram 3: Average Research Intensity (2000-2023)