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POLITICS AND TECHNOLOGY INNOVATION: ANTECEDENT AND MODERATING FACTORS INFLUENCING TECHNOLOGY ORIENTATION AND TECHNOLOGY INNOVATION PERFORMANCE

presented by Oliver Degnan

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POLITICS AND TECHNOLOGY INNOVATION: ANTECEDENT AND MODERATING FACTORS INFLUENCING TECHNOLOGY ORIENTATION AND TECHNOLOGY INNOVATION PERFORMANCE

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ABSTRACT

The political discourse in the United States has carried tremendous division over the last few years and throughout the COVID-19 worldwide pandemic. Corporate CEOs have not been immune to this political division and have often found themselves (openly) aligning with one side. Although CEOs have permanently been politically affiliated, recent years have brought this phenomenon into the limelight. So naturally, the question of how the CEO's political characteristics influence an organization becomes an important research question to be examined. Prior research in management has examined CEO political affiliation and its influence on organizational-level outcomes such as business performance. However, as technology takes center stage in many organizations, the effects of CEO political characteristics on technology innovation and performance require examination. Still, they have not received research attention in prior literature.

This study instilled clarity into this phenomenon by studying 256 human resources professionals and their perception of the CEO's liberal tendencies. The results of this study empirically show significant effects of the CEO's political orientation on the organization's technology orientation with increased influence on technology innovation performance.

A partial least squares structural equation modeling (PLS-SEM) analysis was performed to find support for the various relationships in the hypothesis.

This study’s findings provide new consideration for the company’s board of directors and human resources hiring managers to find CEOs that positively influence technology orientation and are more prone to delivering a higher level of technology innovation performance.

Finally, this study provides much-needed guidance on the importance of the CIO reporting directly to the CEO to promote an organizational environment that is willing to change to accelerate technology innovation performance.

Keywords: CEO, Political Affiliation, Technology Orientation, Innovation Performance, Willingness to Change, CIO, Reporting Relationship.

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Introduction

Throughout the political discourse in recent years and Big Tech's increasing activity in influencing the political landscape (Collinson, 2020; Sally, 2020), customers, company boards, and investors have started to notice the effects of the CEO's political orientation on the firm performance (Rupinder & Balwinder, 2019; Wu et al., 2013). More than that, some CEOs openly voiced their political affiliation in public and internal forums with an agenda to steer and influence political discourse (Chin et al., 2013). Aside from that, some high-profile leaders of Big Tech, such as the CEOs of Twitter, Amazon, and Facebook, took their political ideology to the United States Congress to influence public perception (France24.com, 2021). As CEOs face away or are being distracted from their internal leadership responsibilities to participate in political discourse, the internal mechanism of technology innovation might need to be recalibrated to continuously steer towards market competitiveness and technological advancement, regardless of the CEO's personal political orientation.

Prior research has shown that the CEO's internal involvement in leading change is an essential ingredient for sustainable technology innovation (Zaman et al., 2020). The CEO takes on a critical role in setting the *tone at the top* and influencing the company's technology orientation and the employee's willingness to change to increase the firm's technology innovation performance (Patelli & Pedrini, 2015; Schwartz et al., 2005; Zaman et al., 2020). However, prior studies have not yet empirically measured to what extent the CEO's political orientation influences the firm's technology orientation and the freedom for the organization to adopt new technology for the purpose of rapid technology innovation.

Technology orientation is culture-based and firm-specific which fits with the Resource-Based View (RBV) of the firm (Halac, 2015). Furthermore, technology orientation is largely identified by the CEO's commitment for R&D and the acquisition of new breakthrough technology to increase firm performance and competitive market positioning (Gatignon & Xuereb, 1997; Halac, 2015).

Technology orientation and its effects on technology innovation success have been studied to some degree. This also includes the effects of the corporate culture (Fiordelisi et al., 2019) on the firm's willingness to change in favor of innovation performance (Drucker, 1998). However, this study adds the much-needed understanding of the importance of the CEO's political orientation on technology orientation and its subsequent effects on technology innovation performance. Moreover, looking at the political climate post-pandemic 2021, the trend of corporate leadership's involvement in political discourse might remain the norm and possibly even increase in the near future (Seib, 2021). Thus, the need increases to correctly measure those effects associated with the CEO's political discourse and beliefs and how those beliefs and views alter and shape the CEO's corporate tone and directive.

Considering the aspects mentioned above, the following research questions need to be examined:

(1) To what extent does the CEO's political orientation influence the company's technology orientation? Moreover, how does this influence the short- and long-term effects on the company's technology innovation performance?

(2) To what extent does the CEO-CIO reporting relationship influence the corporate technology orientation?

(3) To what extent does the organization's willingness to change influence the level of technology orientation? And how does this affect corporate technology innovation performance?

Literature Review

The CEO Influence

The CEOs influence on the organization and external stakeholders (investors and shareholders) is the individuals' ability to steer corporate behavior, investor relationships, and long-term shareholder support for the benefit of the firm's financial and performance sustainability (Fiordelisi & Ricci, 2014; Rupinder & Balwinder, 2019; Yuan et al., 2019). Much of the CEOs internal and external behavior can be associated with the cultural behavior of the organization and its motivation towards technology innovation (Fiordelisi & Ricci, 2014).

The upper echelon theory can explain some of the messaging throughput from the top leaders to the lower parts of the organization in regards to the corporate messaging on strategy and objectives (Hambrick & Mason, 1984). This study incorporates prior research guidance to help guide the understanding of the CEO's behavior (based on political orientation) and its influence on technology orientation (Bixter, 2015; Chin & Semadeni, 2017; Xu et al., 2021). For that reason, the tone at the top, as carried by the CEO, throughout the corporate messaging strategy is known to add underlying, and in some cases, subliminal context to the perceived corporate message. This can influence the organization's beliefs, views, motivation, and strategic execution (Patelli & Pedrini, 2015; Schwartz et al., 2005). The CEO has tremendous influence over the corporate perception of reality and as such is one of the key influencers of corporate technology orientation and technology innovation (Fiordelisi et al., 2019; Fiordelisi & Ricci, 2014; Zaman et al., 2020).

The CEO liberalism has been found to have an influence on corporate pay committees and the salary and wages arrangements for employees (Chin & Semadeni, 2017). Aside from that, the CEO's political affiliation has direct effects on the corporate social responsibility and its effects on firm performance long-term (Chin et al., 2013). Corporate political connections have tangible effects on IPO performance. Corporate connections are carried and maintained by the corporate CEO externally and internally (Wu et al., 2013). The CEO's connections to political parties do have short- and long-term effects on the organization as it pertains to the corporate culture type and the employee's willingness to change for the benefit of technology innovation performance and perceived innovation success in the market place (Fiordelisi et al., 2019; Francis et al., 2012; Hu et al., 2017; Zaman et al., 2020).

In 1983, Quinn and Rohrbaugh conceptualized the competing values framework (CVF) to produce a corporate model to measure and define the organization's culture type. The proposed CVF added a three-value dimension for the culture types of control-flexibility, internal-external, and means-end. These three dimensions underline the effectiveness of the organization in regard to performance and sustainability of performance (Quinn & Rohrbaugh, 1983). In a similar effort, the CVF was then enhanced in later publications with four dimensions (collaborate, create, control, and compete) to describe the flexibility and discretion of the organizational culture types (Fiordelisi et al., 2019). These types of cultures are influenced by executive leadership and the CEO of the company. More precisely, the corporate culture mirrors the beliefs, world-views, political opinion and affiliations, and actions in accordance with the upper echelons theory and the resulting tone at the top by upper management (Fiordelisi & Ricci, 2014; Hambrick, 2007; Hambrick & Mason, 1984; Quinn & Rohrbaugh, 1983).

Prior research also shows that the perceived environmental uncertainty by the organization, its leaders, and employees can have a profound influence on corporate culture and firm performance. Specifically, the CEO’s views on environmental uncertainty directly influences corporate strategy and execution velocity (Waldman et al., 2001). Waldman continues to point to the individual influence of the environmental forces: “According to Milliken (1987), uncertainty can be defined in terms of an individual's perceived inability to understand the direction in which an environment might be changing, the potential impact of those changes on that individual's organization, and whether or not particular responses to the environment might be successful” (p. 136). The Milliken (1987) study has been instrumental on the understanding of transactional leadership but was limited in that the term transformational leadership was not yet coined by observational research, which was later addressed by later literature in and around 2001.

Stewardship theory and duality theory provide the basis to consider the CEO’s executive influence and power on defining the corporate culture. When the CEO is also the board’s chairman, the CEO’s accountability is increased to external and internal parties, and as a result they might be willing to take on more risk in disruptive innovation that in turn can increase firm performance long-term (Rupinder & Balwinder, 2019; Yuan et al., 2019).

Leadership ethics and ethical corporate behavior should also be considered when assessing the CEOs influence on the organization and its strategy. A code framework of ethics was proposed in prior research to define the level of corporate ethics as (1) honesty, (2) integrity, (3) loyalty, (4) responsibility, (5) fairness and (6) citizenship (Schwartz et al., 2005). Ethics is an important aspect of corporate culture and strategy execution and often is directly influenced by upper management and the CEO particularly. Management close to the CEO can also influence the CEO's ethical perception and behavior (Banker et al., 2011; Krotov, 2015).

Intellectual stimulation is a construct that prior research identified to influence the CEO's perceptions and actions also (Waldman et al., 2006). Outside of the CEO's charismatic leadership traits, intellectual stimulation asserts an alignment with beliefs and individual experiences that can act as an additional stimulant to influence ideological values of the organization. This phenomenon can influence management groups and internal tribes to achieve desired organizational outcome (Hambrick, 2007).

The CEO is a key driver of innovation in an organization and the chief influencer for organizational groups and individual contributors. The ability for the CEO to motivate employees is a quality component of transformational leadership and its theory (Bhaskar & Paulina, 2016). One of the key indicators of the CEO's successful long-term execution of corporate strategy is the CEO's positive outlook on the future and the communication to employees (Bhaskar & Paulina, 2016; Hambrick, 2007).

Sharp et al. (2017) proposed that there must be other stimulants in upper management that contribute to a stronger innovation performance, indicating that if the executive team is not homogeneous then new technology innovation might not always and often lead to new product commercialization. This insight is critical as it added to the definition of innovation when there is commercialization. When and if a company commercializes intellectual property in the form of an innovative new product is heavily influenced by the CEO's modus operandi and intellectual stimulation and corporate culture (Bhaskar & Paulina, 2016; Fiordelisi et al., 2019; Sattayaraska & Boon-itt, 2018; Sharp et al., 2017).

Table 1 shows a list of references of relevant literature review pertaining to this study.

Table 1

References for the CEO Influence on the Organization

Authors	**Theories (Method)**	**Contribution**
Robert Quinn, John Rohrbaugh (1983)	Competing Values Framework (Conceptual)	Produced new model to clearly show embedded concepts in organizational effectiveness and provides an overarching framework for guiding organizational assessments for efficiency.
Donald Hambrick, Phyllis Mason (1984)	Upper Echelons Theory (Prior research collection analysis)	"The theory tries to explain a correlation between the organizational outcome and managerial background characteristics." (Wikipedia)
David Waldman, Gabriel Ramirez, Robert House (2001)	Upper Echelons Theory (Survey Data)	CEO leadership and performance depends on perceived environmental uncertainty. The CEO's charisma predicted performance in uncertain environmental conditions, but not under conditions of environmental certainty.
Mark S. Schwartz, Thomas W. Dunfee, Michael J. Kline (2005)	Upper Echelon Theory, Agency Theory (Survey Data)	Proposes new ethics framework for executive leaders and is based on six universal core ethical values: (1) honesty; (2) integrity; (3) loyalty; (4) responsibility; (5) fairness; and (6) citizenship.
David Waldman, Donald Siegel, Mansour Javidan (2006)	Transformational Leadership Theory, Stakeholder Theory, Leadership Theory, Path-Goal Theory (Survey Data)	The CEOs intellectual stimulation has a stronger propensity of the firm to engage in strategic corporate social responsibility initiatives.
Donald Hambrick, Phyllis Mason (2007)	Upper Echelons Theory (Prior research collection analysis)	Adds to the original research by including executive groups, which can yield to better organizational outcomes.

Joel Armenic, Russell Craig, Dennis Tourish (2010)	Upper Echelons Theory (Conceptual)	CEOs place a strong emphasis on unified corporate culture. They keep a keen eye on the 'tone at the top' executive levels internally and externally.
Franco Fiordelisi, Ornella Ricci (2014)	Competing Values Framework (Survey Data)	Poor firm performance is not related to CEO turnover. Competition- and creation-oriented cultures have higher CEO turnover.
Lorenzo Patelli, Matteo Pedrini (2015)	Upper Echelons Theory (Survey Data)	A more aggressive financial reporting is found in firms with a CEO using a language that is absolute, complex, and not engaging.
Bhaskar Prasad, Paulina Junni (2016)	Contingency Perspective on Leadership, Theory of Transformational Leadership, Leadership Theory (Survey Data)	CEO plays a central role in the organization and heavily influences organizational innovation. CEO can be seen as a key driver for organizational change. CEO's providing a longer-term positive future is key to organizational innovation.
Barton Sharp, Dinesh Iyer, Thomas Brush (2017)	Upper Echelon Theory, Agency Theory (observed effects), Executive Discretion Theory (Survey Data)	Age of executives has no effect on innovation. Firm tenure has a significant negative impact on converting inventions into new products (commercialization).
Evan Straub (2017)	Adoption Theory (Survey Data)	Technology adoption depends on cognitive, emotional, and contextual stimulants that must be addressed simultaneously in organizations.
Tharnpas Sattayaraksa, Sakun Boon-It (2018)	Theory of Transformational Leadership (Survey Data)	CEO transformational leadership (Senior and Fleming, 2006) indirectly affect product innovation performance through an innovation culture. Organizational learning is a key quality for the culture to promote increased levels of innovation.

Abdelrahman Zuraik, Louise Kelly (2019)	Theory of Transformational Leadership (Survey Data)	The "role of climate" is an important factor in organizational innovation. Transformational leadership is making it easier to advance new ideas.
Kaur Rupinder, Singh Balwinder (2019)	Upper Echelons Theory, Agency Theory, Resource-Based Theory, Stewardship Theory (Survey Data)	Finds that long-term CEOs negatively influence firm performance [when female]. The more shares the CEO has and/or when CEO has duality, the higher the ROA/ROE on the firm performance level.
Umer Zaman, Shahid Nawaz, Raja Danish Nadeem (2020)	Theory of Adoption, Theory of Transformational Leadership (Survey Data)	CEO transformational leadership has a positive effect on project management, technology selection, and overall innovation performance.

The CEO's Political Orientation

Primarily marketing literature and psychology studies examined the individuals' political orientation and political affiliation respectively. Whereas the political affiliation has been measured by examining FEC filings – over $200 in the United States – of cash contributions to a political party, the political orientation is an applied measure of the attitude towards a political agenda and viewpoint (D. J. Mueller, 2010; Van Leeuwen & Park, 2009; Wu et al., 2013).

An early theory proposed by Rokeach (1968) provided a 36 values survey to help rate personal orientation on the levels of beliefs, attitude, and value. Rokeach's political orientation theory provided a first-of-kind basis to examine liberal and conservative orientation. Mueller (1974) challenged Rokeach's theory and asserted freedom as an abstract for conservatives and that their behavioral referents are more restricted than compared with liberal Democrats. Rokeach's 36 values survey was then further categorized into a multidimensional matrix to identify the culture-level value types in an effort to understand political orientation as a personal choice reflecting of behavior and internal beliefs (Vauclair et al., 2011). A multi-study examining the social dominancy theory also found that the combined Big Five aspect scales with liberal political orientation measures show positive associations with openness, curiosity, compassion, and depression, and a negative influence on orderliness, politeness, and assertiveness with liberal leaders (Xu et al., 2021).

Aside from Rokeach and Vauclair surveys to empirically measure personal political orientation, most subsequent studies leveraged a single-item measure (5, or 7, or 9 scale items) on a Likert scale to either measure liberalism or conservatism respectively. Those prior single-item studies offered surveys with scales between (1) “Very left” to (7) “Very right”, or (1) “Extremely Liberal” to (7) Extremely Conservative” and have been effective in determining the political orientation (Bixter, 2015; Van Leeuwen & Park, 2009). Those survey scales captured the personal perception of the political orientation by oneself, another person, or the entire organization. Prior studies applied single-item measures in conjunction with the signalizing theory (Wu et al., 2013), institutional theory, and the population ecology theory (Chin et al., 2013) to measure the effects of the CEO’s behavior, attitude, and values on the corporate workforce.

Furthermore, the top-level leadership’s political orientation influences decisions on new investments and can explain the significant heterogeneity in firm capital structure and investment policies (Hutton et al., 2014). Whereas conservatives tend to favor a long-term outlook in new investments, liberal executive leaders have a tendency to take new risks in benefit of short-term gains to increase competitiveness (Di Giuli & Kostovetsky, 2014; Francis et al., 2012; Hu et al., 2017).

Companies also tend to score higher in corporate social responsibility (CSR) when located in Democratic states or when the CEO is more liberally oriented (Di Giuli & Kostovetsky, 2014). Conservative CEOs perceive CSR as an unnecessary activity with little immediate gain and usually abstain from such investments all together. Liberal CEOs invest in their local communities and employees for the derivative benefit of producing a happy workforce (Bixter, 2015; Borghesi, 2018). CEOs that are closer to retirement and are the chair of the board also engage in more CSR activity (Yuan et al., 2019).

Connections to political parties are often leveraged by CEOs to gain a certain level of favoritism in public policy-making in support of their corporate strategy long-term. This phenomenon is present with both liberal and conservative CEOs who personally contribute to one (or both) parties. Cash contributions to a specific political party usually align with the long-term business strategy, but they do not always reflect the CEO's personal political orientation (Cohen et al., 2019; Hu et al., 2017; Jeong & Nari, 2019; Krishan, 2021; Wu et al., 2013; Yan & Chang, 2018).

Additionally, prior research also shows that Republican CEOs can attain a higher credit rating for their firms when located in a conservative state, because credit bureaus assume that the CEO's political orientation reflects internal corporate policies (Bhandari & Golden, 2021). In conjunction with favorable financial opportunities for the firm, the CEO's political ideology can affect top manager pay (Chin & Semadeni, 2017). Prior literature also shows that the CEO's involvement and public support in a political party inadvertently influences the CEO decisions internally and the selection of the TMT (Top Management Team), thus having long-term effects on workforce culture (Cohen et al., 2019).

Table 2 provides a list of references relevant to the construct of the CEO's political orientation.

Table 2

References for the CEO Political Orientation

Authors	Theories (Method)	Contribution
Daniel J. Mueller (1974)	Rokeach's two-dimensional political orientation theory (Survey Data)	Challenges prior theory by Rokeach and asserts that freedom as an abstract for conservatives, their behavioral referents are more restricted than compared with liberal Democrats.
Van Leeuwen et al. (2009)	Socialization Theory, Cognitive-Motivational Theory (Survey Data)	Perceived social dangers and political conservatism can be mediated by moral attitudes.
M. K. Chin, Donald C. Hambrick, Linda K. Trevi (2013)	Institutional Theory (DiMaggio and Powel, 1983), Population Ecology Theory (Hannan and Freeman, 1977), Agency Theory, Upper Echelons Theory (Survey Data)	Measures of political orientation, whereas conservative CEOs are more influenced by corporate performance in terms of CSR involvement.
Jianfeng Wu, Sali Li, Zijie Li (2013)	Signaling Theory (Survey Data)	CEO political connections are critical for IPO performance. CEO social and political connections are relevant to consider regarding IPO performance and corporate values and behavior.
Irena Hutton et al. (2014)	Theory of Behavioral Consistency (FEC data analysis for campaign contributions by CEOs)	The authors found a significant positive correlation between the measures of political orientation and the self-reported political orientation of CEOs.

Alberta Di Giuli, Leonard Kostovetsky (2014)	Direct-Value Theory, Delegated Philanthropy Theory (Survey Data)	Companies score higher on CSR when located in Democratic states and with liberal leaders than compared to conservative leaders.
Michael Bixter (2014)	System-Justification. Theory, Terror Management Theory, Social Identity Theory (Prior research and data analytics.)	Found a positive correlation between happiness and political orientation conservatism and religiosity.
Fang Hu and Jenny Stewert, Weiqiang Tan (2017)	Agency Theory, Resource Dependency Theory (Survey)	The CEOs political affiliation and connection to influence the opinions regarding auditing. Companies with CEOs politically connected to a governing party experience more favorable auditing opinion.
Bill Francis, Iftekhar Hasan, Xian Sun (2017)	Political Preference Theory (FEC data + survey)	Firms with Republican CEOs have higher tax avoidance. Republican CEOs' tax decisions are driven by political preferences and that Democratic CEOs' tax decisions are driven by risk incentives.
M. K. Chin, Matthew Semadeni (2017)	Upper Echelon Theory (Survey Data)	CEO political ideology affects top manager pay and conservative CEOs tend to favor individualism.
Jackie Yan, Sea-Jin Chang (2018)	Agency Theory, Political Network Theory (Survey Data)	Political connections can be both an asset and a liability [when caught in a political crossfire between governments].
Richard Borghesi (2018)	Agency Theory, First-Difference Theory (Survey Data)	CSR activities are largely driven from the bottom-up with employees who like to express their sociopolitical orientation.

Yuan Yuan, Gaoliang Tian, Louise Yi Lu, Yangxin Yu (2019)	Corporate Social Responsibility Theory (Survey)	CEOs that are closer to retirement and are the chair of the board engage in more CSR activity.
Nara Jeong, Kim Nari (2019)	Upper Echelons Theory (Survey Data)	The government political orientation influences CEOs who care more about their own business versus corporate social responsibility.
Alma Cohen, Moshe Hazany, Roberto Tallaritaz, David Weiss (2019)	Agency Theory, Upper Echelons Theory, Structural Theory (Survey Data)	CEO's involvement and public support in a political party to steer US policy inadvertently influences CEO decisions internally and the selection of the TMT (Top Management Team).
Avishek Bhandari, Joanna Golden (2021)	Behavior Consistency Theory, Upper Echelons Theory, Social Identity Theory, Organizational Psychology Theory (Survey Data)	Republican CEOs have a higher credit rating for their firms when located in a conservative state; because credit bureaus assume that CEO political orientation reflects internal corporate policies.
Nihal Krishan (2021)	Upper Echelons Theory (Survey Data)	CEOs political affiliation drives lobbying as strategic investment to suit corporate strategy. Companies also fund other corporate initiatives (e.g., Think Tanks) to gain access to policy makers.
Xiaowen at al. (2021)	Social Dominance Theory (Survey Data)	Combined Big Five aspect scales with liberal political orientation measures to show positive associations with openness, curiosity, compassion, and depression. A negative influence on orderliness, politeness, and assertiveness was also found in liberals.

The CEO-CIO Reporting Relationship

An additional factor of influence on the CEO, the company’s technology orientation, and the resulting effects on technology innovation performance is the reporting relationship between the CEO and the CIO (Chief Information Officer). This topic has been discussed for years with prior research findings supporting two distinct corporate pathways of the reporting relationship for the CIO based on corporate business strategy (Banker et al., 2011; Copeland, 2001; Krotov, 2015). For organizations with pressures on cost, spending, and financials, the reporting relationship of the CIO is often reporting to the CFO (Chief Financial Officer) in an effort to facilitate IT initiatives in alignment with the firm's cost leadership strategy (Banker et al., 2011). Organizations that pursue a differentiation strategy more often resort to a CEO-CIO reporting relationship (Banker et al., 2011; Krotov, 2015). The critical insight here is that prior research has provided evidence of the effects of CEO-CIO reporting relationship being more favorable to advance an agenda to increase its technology innovation performance.

Furthermore, the CIO reporting relationship with the company leader can influence the CEO's general attitude towards information technology. In particular, the CEO's attitude towards technology change, perception of industry relevance of technology, and the personal experience with technology innovation all promote comfort or discomfort with strategies of differentiation with technology innovation (Feeny et al., 1992). Likewise, and equally important, is the CIO's personal orientation towards reporting directly to the CEO. The ability for the CIO to speak the language of business is an essential ingredient to an effective reporting relationship with the CEO. The CIO's business orientation, conception of the IT role, and career background relevant to the business are critical ingredients for a favorable CIO profile that matches the CEO's expectations of a fruitful CEO-CIO reporting relationship (Feeny et al., 1992). With that being said, not every CIO profile is well suited to reporting to the CEO directly. Prior research indicates that a CIO must have a strong bond with the CEO to be able to collaborate on a company vision to transform the organization with the use of technology. The vision component

– amongst the ability to talk the same *business language* – cannot be understated and is shown to be one of the deciding factors of a successful CEO-CIO reporting relationship. If the visions do not match, the CEO-CIO reporting relationship is poised to fail in enabling the firm’s differentiation strategy (Feeny et al., 1992).

Krotov's (2015) empirical findings indicate the importance of the CEO to feel comfortable getting involved in matters of information technology. Likewise, the CIO should seek comfort in the CEO supporting the CIO’s agenda and goals in technology innovation (Krotov, 2015). This is important, because traditional CIOs build a reputation for themselves of raising the walls around IT by not collaborating with other segments of the organization to solve complex business problems and often just shove new tech down the organization’s throat. This phenomenon inadvertently increases the barrier for IT to proactively connect with the organization to solve complex problems, to innovate, and to leverage technology as a competitive differentiator (Banker et al., 2011; Copeland, 2001; Krotov, 2015). The ability for a CEO to get involved in IT is a necessity to produce a successful IT function (Young & Jordan, 2008).

Generally, CEOs are optimistic about the impact of IT projects on the organization. This phenomenon is accented by a healthy CEO-CIO reporting relationship and the frequency in which the CEO communicates with the CIO, which is a strong predictor of the shared understanding of IT value (Johnson & Lederer, 2007). Prior research also finds that the CEO’s support for IT projects is a primary predictor and indicator to forecast the successful outcome of IT projects. More importantly, the CEO’s direct involvement in IT project execution and strategy increases the willingness to change amongst employees (Young & Jordan, 2008). The ability for organizations to adopt new technology and to innovate faster is also positively influenced by the

CEO’s involvement and accessibility to the IT organization and the partnership with the CIO (Song et al., 2010).

In conjunction with the CEO’s influence on the willingness to change and adopt new technology organizationally, the CIO’s role of the educator is a key enabler for the CEO’s transformative vision and goal setting in the organization and often leads to increased levels in utilizing innovative technology for enhanced efficiency gains via automation (Al-Taie et al., 2014). Additionally, the CEO’s positive association with the IT organization – through his/her relationship with the CIO – positively influences the organization’s technology orientation, which is more geared towards new technology innovation in creative cultures (Al-Taie et al., 2014; Banker et al., 2011; Fiordelisi et al., 2019; Fiordelisi & Ricci, 2014).

Table 3 provides a list of references relevant to the construct of the CEO-CIO reporting relationship.

Table 3

References for the CEO-CIO Reporting Relationship

Authors	**Theories (Method)**	**Contributions**
David Feeny, Brian Edwards, Keppel Simpson (1992)	Upper Echelons Theory (Survey Data)	The CEO attitude towards IT/technology is influenced by the CIO's personal attributes.
Raghunathan (1992)	Psychometric Theory (Nunally 1983) (Survey Data)	Positive impact on IS when CEO is part of the IS Steering Committee. TMT involvement in steering committee is not as high of an impact as the CEO's direct involvement.
LA Tai, R Phelps (2000)	Organizational Knowledge Creation Theory (Nonaka 1994) (Survey Data)	The CEOs involvement in IT decision making enhances the alignment of views and perspectives on technology orientation for the CEO and the CIO, thus providing more clarity and stability for the organization.

Lee Copeland (2001)	Upper Echelons Theory, Leadership Theory (Survey Data)	When CIO reports to the CFO, financial performance is at the forefront; when CIO reports to the CEO, the CIO serves the entire organization and its interests.
Darrell Burke, Nir Menachemi, Robert Brooks (2006)	Upper Echelons Theory, Leadership Theory (Survey Data)	"CIO tenure is associated with greater health care information technology adoption, whereas the reporting structure of the CIO is not."
Alice Johnson, Albert Lederer (2007)	Leadership Theory, Steward Theory (Survey Data)	Successful CEO-CIO relationships are linked to shared vision of technology. Common views are derived from the quality and effectiveness of the communication between the CEO and the CIO.
Raymond Young, Ernest Jordan (2008)	Leadership Theory (Survey Data)	Top management support (CEO, CIO) is the most important factor for project implementation success, to the contrary of prior research that user involvement and project planning lead to project success.
Dan Song, Dong Li, Lingyun Qiu (2010)	Relevant Theory (Survey Data)	CIOs as a member of the top management team has the best chance for meaningful strategic contribution.
Rajiv Banker, Nan Hu, Paul Pavlov (2011)	Upper Echelons Theory, Strategy Structure Theory, Alignment-Fit Theory (Mintzberg1990) (Survey Data)	The CIO reporting structure is dependent upon the firm's business strategy.
Palvia et al. (2012)	Entrepreneurial Orientation Theory (Survey Data)	It's important for the CEO and the CIO to share agreement on the IT priorities and those priorities do enable the anticipated business outcomes. If both agree on the IT issues, proper prioritization will enable the organization to deliver valuable IT. Vice versa, a lack of alignment is counterproductive.
Maoyassar Al-Taie, Michael Lane, Aileen Cater-Steel (2014)	Contingency Perspective on Leadership, Theory of Transformational Leadership, Leadership Theory (Survey Data)	The organizational strategic IT vision can be accelerated elevating the CIOs structural powers in terms of the reporting level.

Vlad Krotov (2015)	Upper Echelons Theory, Agency Theory (Survey Data)	"CEOs should take an active part in ensuring the alignment of IT with organizational strategy and using IT for creating organizational value."

The Effects of Technology Orientation

Halac (2015) defines technology orientation as “a way to sustainable competitiveness”. Halac goes on to define a multidimensional construct of technology orientation with the macro components of top management capability, technological capability, learning and unlearning. Those components of technology orientation are “associated with final outputs of product innovation process” (Halac, 2015). Because of the focus on organizational capabilities, technology orientation has a significant influence on the firm’s ability to innovate rapidly in times of great change. The level of technology innovation is viewed as a source of competitive advantage to position the organization strategically (Al-Ansari et al., 2013).

The technology orientation of a company influences the strategic decisions on acquiring new technology from the outside or to invest in internal R&D, and to what extent (Halac, 2015). Oftentimes, the organization’s internal belief system on what is possible regarding technology innovation is influenced by the views on the technology orientation from a cultural resource-based view (Fiordelisi et al., 2019; Halac, 2015). The corporate perception on technology orientation correlates with the beliefs and views of the employees on their freedom and ability to build on previous innovation for the benefit of new technology innovation. This is sometimes accomplished by extending existing vendor technologies or iteratively improving internal technology solutions (Al-Ansari et al., 2013).

Corporate technology orientation also has effects on the technology leadership and the strategic directives regarding what projects are being “taken on” that increase technology innovation performance versus projects that “keep the wheels spinning” (Zaman et al., 2020). When leaders and employees experience a technology orientation that is open to change and available to be extended [technically], more opportunity arises to innovate more rapidly for the benefits of increased firm performance and technology innovation performance (Derozier, 2003; Gatignon & Xuereb, 1997; Hakala & Kohtamäki, 2011; Zaman et al., 2020).

Leadership theory is an integral component to further guide corporate structure team leaders in an organization to implement favorable processes that increase innovation and address the many aspects of organizational innovation (Humphreys et al., 2005). The hands-on involvement of leadership in process and execution in innovation is a favorable facet for promoting a well-aligned creative corporate culture with a view towards a technology orientation that provides creative readiness for competitiveness (Bessant & Francis, 1999).

Zhou et al. (2005) conducted additional prior research on technology orientation and its effects on market competitiveness by combining the theory of competitive rationality and competition theory. This study concluded that “technology orientation is beneficial to technology-based innovations but has no impact on market-based innovation”, with similar findings in the 2008 study by Grinstein who suggests that “market orientation is strongly correlated with learning, entrepreneurial, and employee orientations, and that it has a moderate positive relationship with innovation orientation” (Grinstein, 2008; Zhou et al., 2005).

To better understand technology adoption in organizations and why adoption is a factor of technology orientation, it is critical to understand why individuals adopt new technology. Roger’s innovation theory and the concerns-based adoption model provide prior guidance in the complexity of corporate technology adoption, which is inherently social in its nature and depends on individual and group perceptions of the organization's future (Straub, 2009). Prior literature and the work by Straub highlight that technology adoption is a complex social and developmental process and must address cognitive, emotional, and contextual concerns and is the basis for technology orientation (Straub, 2009).

Table 4 provides a list of references relevant to the construct of technology orientation.

Table 4

References for Technology Orientation

Authors	Theories (Method)	Contributions
Gatignon and Xuereb (1997)	Market Orientation Theory, Diffusion Theory (Questionnaire to 3,000 marketing executives)	Strategic orientation of a firm (customer, competitive, technological orientation) determines product innovation performance. A structural model is proposed.
Caroline Derozier (2003)	Market Orientation Theory (Survey of 640 companies.)	Investigates the relationships between new product creativity, market program creativity, and business performance through the lens of current-market focus and future-market focus. Added construct of technology orientation.
Humphreys et al. (2005)	Leadership Theory (Mixed study gathering longitudinal data over 6 years.)	Innovation must be implemented using a broad range of perspectives and interventions.
Zhou et al. (2005)	Theory of Competitive Rationality, Theory of Competition (Sampled 2260 brands of consumer products from the China Marketing and Media Study.)	A firm's market orientation and market focus determine the technology orientation and influence levels of technology and breakthrough innovation and firm performance.
Grinstein (2008)	Marketing Theory, Entrepreneurship Theory (Meta-analysis of prior 70 studies.)	There are other corporate orientations that contribute to a strong market orientation and its effects on firm performance. Such as entrepreneurial orientation, strategic orientation, and technology orientation.

Straub (2009)	Roger's Innovation Diffusion Theory, Concerns-based Adoption Model, Acceptance Theory (Examination of existing theories on technology adoption and innovation.)	Technology adoption is a complex social and developmental process. Technology adoption must address cognitive, emotional, and contextual concerns.
Hakala et al. (2011)	(1,283 companies from Finland database.)	Learning capability is increased by utilizing multiple strategic orientations simultaneously (e.g., consumer orientation, technology orientation, entrepreneurial orientation). Innovation performance increases as a result of increased organizational learning.
Al-Ansari et al. (2013)	Technology Orientation, Innovation Theory, Customer Value-Based Theory (Survey data from 200 SMEs.)	Technology orientation influences innovation and that there is a link between technology orientation and firm performance being mediated by innovation.
Halac (2015)	Learning Theory, Resource-Based View (Two-step field survey with 147 firms.)	Four-dimensional construct of technology orientation (top management capabilities, technology capability, commitment to learning, commitment to change).
Bessant and Francis (1999)	Strategy Theory	Outlines characteristics of continuous improvement (CI) in organizations and CI's importance to strategic advantage.

The Corporate Willingness to Change

The corporate "willingness to change is defined as a positive behavioral intention towards the implementation of modifications in an organization's structure, work, or administrative processes, resulting in employee efforts to support or enhance the change process" (Metselaar, 1997, p. 34). Industry holds many examples of failed companies that could not adopt to the change of time and could not keep up with taking advantage of new technology trends and advancement. Some of the more well-known corporate disasters in history are companies such as

Nokia, CompUSA, Atari, and Blockbuster. In these examples, the leadership was not capable of influencing their organizations to change and innovate faster and produce new disruptive technology to advance their business model profitably. Likewise, those companies' corporate culture was dialed into the thrust of control in an hierarchical culture type with a primary focus on cost control, timelines, and smooth functioning (Fiordelisi et al., 2019). In those cases, the corporate willingness to change diminished given their cultural orientation and ultimately gave away their foundation to compete effectively and sustainably.

Some of the key attributes to assess corporate willingness to change are by looking at how much resistance there is to change and if employees adapt themselves to change easily (Halac, 2015). For employees to embrace change as an opportunity to increase their market competitiveness, both leadership and the corporate workforce would have to adopt a culture type of adhocracy and market. Both types lead to a creative corporate thrust to innovate quickly and compete effectively with a willingness to embrace change in technology orientation (Al-Ansari et al., 2013; Fiordelisi et al., 2019; Halac, 2015; Zaman et al., 2020).

Metselaar (1997) coined the term "willingness to change" as a key element of implementing organizational change. As part of his research, Metselaar looked at several existing theories and in particular the resistance theory as a guiding principle to differentiate between organizational resistance and the willingness to change. To clearly differentiate between the two, Metselaar defined a new measurement scale based on prior literature in psychology and the DINAMO project to effectively measure the mid-level manager's willingness to change (Metselaar, 1997). Thereafter, new research on organizational outcomes often references the term "willingness to change" and the associated scale as a moderator or mediator respectively.

Another aspect is the organization's preparedness to change, which was studied by Schyns et al. (2007) with a view to better understand employee turnover intentions. Schyns had previously introduced the concept of preparedness for change in 2001 and provided additional insight into the preparedness for change by identifying antecedents of employability, the leader-member exchange theory (LMX), and occupational self-efficacy (Schyns et al., 2007). The key difference between the preparedness for change and the willingness for change is "situated on the level of the individual's desire" (Schyns et al., 2007).

Successful implementations of change often depend upon the ability for individuals to make sense of the proposed change. The making sense theory was proposed by Schreuers et al. in 2009 and has been adopted by subsequent literature as an indicator to measure an organization's willingness to change. When employees can not decipher and extract meaning out of proposed change actions, their willingness to change decreases and can have profound negative effects on strategy outcome (Schreurs et al., 2009).

Existing literature on the effects of entrepreneurial orientation (EO) does also show that EO can positively influence new product innovation but is mediated by the willingness to change. An organization's ability to maintain a creative culture depends upon the organization's strategic posture toward entrepreneurship (Dayan et al., 2016). On the contrary, previous research hypothesized a correlation between the willingness to change and its relationship with the innovation in services performance, but results showed that such relationship does not exist (Moreira et al., 2016).

Radical change can induce unwanted disruption to the organization and negatively influence innovation performance, firm performance, and cultural morale amongst employees. The institutional theory describes the importance of leadership to advocate for change in ways to avoid threatening institutional norms (Radaelli et al., 2017). Radical change may be held back by managers if they believe the change is insurmountable. Executive leadership reinforces the institutional norms rather than challenging them for the long-term benefit of radical change (Radaelli et al., 2017).

The planned behavior theory can also provide basis to deconstruct an organization's willingness to change. Planned behavior is strategic action and timed in its execution to move forward organizational change. When change is planned, the organization can prepare its opinions, views, and actions to meet expectations of the planned change (Arnaudova et al., 2022).

Table 5 shows a list of references relevant to the construct of willingness to change.

Table 5

References for Willingness to Change

Authors	Theories (Method)	Contributions
Erwin Metselaar (1997)	DINAMO Theory, Diffusion Theory, Complementary Theory, Planned Change Theory, Management Theory, Resistance Theory, Social Relationships Theory (Survey to mid-management level.)	Provides difference between "resistance" to change and the "willingness to change". Constructs new model for DINAMO to effectively measure mid-level manager's willingness to change. First paper to coin the term "willingness to change".
Schyns et al. (2007)	Action Core Theory, Leader-Member Exchange Theory, Social Learning Theory, Leadership Theory (Questionnaire to German and Dutch employees.)	Relates concepts of turnover intention and preparedness to change. Inserts takeaway that top performers are often more likely to leave - because they are more employable compared to their low-performing peers.
Schreuers et al. (2009)	Organizational Change Theory, Social Cognitive Theory, Self-Efficacy Theory, Career Theory (Survey to 238 employees in public and private organizations.)	Meaning-making theory is an essential construct to measuring the willingness to change on an organizational level.

Dayan et al. (2016)	Entrepreneurial Orientation Theory, Entrepreneurship Theory (Survey to 250 respondents in the UAE.)	Entrepreneurial Orientation can positively influence new product innovation but is mediated by the willingness to change. An organization's ability to maintain a creative culture depends upon the organization's strategic posture toward entrepreneurship.
Moreira et al. (2016)	Neo-Schumpeterian Theory (Survey to 351 companies in Brazil.)	This study could not verify the general assumption of the relationship between the willingness to change and the innovation in service performance.
Radaelli et al. (2017)	Institutional Theory (12 Italian hospital survey.)	Radical change may be hold back by managers if they believe the change is insurmountable. Executive leadership reinforces the institutional norms rather than challenging them for the long-term benefit of radical change.
Arnaudova et al. (2022)	Planned Behavior Theory (Online survey to 498 college students.)	The current state of behavior change determines the willingness to change.

Corporate Technology Innovation Performance

Technology innovation performance is often promoted internally through institutional ownership of the corporate culture (Aghion et al., 2013). This notion is heavily influenced by the CEO and largely depends on the culture type (Fiordelisi et al., 2019; Zaman et al., 2020). Prior research applied two distinguished models for measuring corporate technology innovation performance. The first is to quantitatively measure technology innovation by the number of technology patents awarded and cited (Banker et al., 2011) which takes on a more financial performance view on the effects of technology orientation and corporate culture on technology innovation performance. A more qualitative assessment is to examine the technology innovation success by means of the corporate perception of reality towards innovation performance (Halac, 2015; Zaman et al., 2020). The latter approach focuses on the corporate perception of innovation success on an employee and leadership level by soliciting feedback from the organization on its success to innovate quickly, meaningfully, profitably, and competitively (Zaman et al., 2020).

Large-scale innovators such as Google are well-known for their ability to change and create innovative new product solutions. Google understands the importance of their workforce culture and works organically to retain a creative culture with high resilience and willingness to change. Google invests heavily into their employees. They call it Strategic Patience, where they invest 20% of each employee’s time on any project the employee sees fit to explore and potentially innovate. This type of culture breeds a corporate climate that is willing to change on a dime (Iyer & Davenport, 2008).

Companies with resource constraints cannot invest like Google in providing 20% time to innovate on anything as part of the employee’s employment agreement. Most companies must choose wisely and conservatively in regard to resource constraints to advance and create innovation. Stock & Zacharias (2011) proposed a new framework to specifically help identify innovativeness. The four proposed patterns of innovativeness are integrated innovators, internally driven preservers, proactive customer-oriented innovators, and top-down innovators. Additionally, Stock and Zacharias (2011) went on to define innovation performance as the newness and amount of products produced.

Looking further down the road with the contingency theory, recent studies “extended innovation research by expanding beyond the frequently studied cultural values and norms and adding a third layer of innovation-oriented artifacts” (Stock et al., 2013, p. 293). It was found that cultural artifacts provide adequate mediation of the effects between innovation-oriented values and the norms on innovativeness itself (Fiordelisi et al., 2019; Stock et al., 2013).

When one considers corporate governance of innovation, one finds that CEOs are less likely to be fired when firm performance is low in firms with high institutional ownership. If the market competition is more intense, institutional ownership leads to higher levels of innovation. If CEOs have stock in the company, they are more likely to influence the organization's willingness to change to produce higher levels in innovation performance (Aghion et al., 2013).

Ambidexterity theory can provide an explanation to the balance between exploratory and exploitative innovation. Higher levels of ambidextrous innovation (exploratory and exploitative) lead to better performance. Ambidextrous innovation can act as mediator between technology portfolio (diversification) and innovation performance (Lin & Chang, 2015). The same authors further explained that "since over-emphasizing either exploratory or exploitative innovation may result in unfavorable outcomes, the simultaneous pursuit of both forms has been viewed as the optimal approach in today's dynamic environment" (Lin & Chang, 2015, p.1196).

Another definite aspect of innovation performance is the creation of intellectual capital (IC) and human capital to influence strategy execution with optimal gain expectations. Both components of capital asset, human and intellectual, influence technology innovation performance (Verbano & Crema, 2016).

Growth theory was explored when examining the effects and the importance of technology innovation on economic growth (Kogan et al., 2017). It would be of value to measure the importance of technology innovation outside of the corporate asset evaluation. A new measure was created that can act as a proxy for the private evaluation of patents. This new measure was used to construct an economy-wide index of innovation to help investors and CEOs to make informed decisions on innovation strategy (Kogan et al., 2017).

A firm’s financial performance and technology innovation performance heavily depend on its culture. A hierarchy type culture does have a negative effect on innovation performance. Prior research analyzed the relationship between corporate culture, environmental innovation, and financial performance and showed its significance regarding technology innovation performance (Fiordelisi et al., 2019; Liao, 2018).

Table 6 provides a list of references relevant to the construct of technology innovation performance.

Table 6

References for Corporate Technology Innovation Performance

Authors	Theories (Method)	Contributions
Thomas Davenport, Bala Iyler (2008)	Innovation Theory (Survey Data)	Google invests heavily into their employees. They call it Strategic Patience, where they invest 20% of each employee’s time on any project the employee sees fit to explore and potentially innovate. This type of culture breeds a corporate climate that is willing to change on a dime.
Ruth Stock, Andy Zacharias (2011)	Boundary Theory, Configuration Theory (Survey Data)	Defines framework to identify four patterns of innovativeness: integrated innovators, internally driven preservers, proactive customer-oriented innovators, top-down innovators. Defines innovation performance as the newness and number of products produced.
Ruth Stock, Bjoern Six, Nicolas Zacharia (2013)	Contingency Theory (Survey Data)	"Cultural artifacts fully mediate the effects of innovation-oriented value and norms on innovativeness."
Philippe Aghion, John Van Reenen, Luigi Zingales (2013)	Agency Theory (Survey Data)	CEOs are less likely to be fired when firm performance is low in firms with high institutional ownership. If the market competition is more intense, institutional ownership leads to higher levels of innovation.

Chinho Lin, Chia-Chi Chang (2015)	Ambidexterity Theory, Boundary Theory (Survey Data)	Higher levels of Ambidextrous innovation (exploratory and exploitative) lead to better performance. Ambidextrous innovation as mediator between technology portfolio (diversification) and performance.
Chiara Verbano, Maria Crema (2016)	Theory of ‘dynamic capabilities’, Strategy Theory, Theory of Organizational Creativity (Survey Data)	Technology strategy influences the creation of intellectual measurement components in improving technology innovation performance.
Leonid Kogan, Dimitris Papanikolaou, Amit Seru, Noah Stoffman (2017)	Growth Theory (Survey Data)	Created a new measure that can act as a proxy for the private evaluation of patents. Constructed an economy-wide index of innovation.
Zhongju Liao (2018)	Culture-Behavior Theory, Institutional Theory, Stakeholder Theory, Resource-Based Theory, Upper Echelons Theory (Survey Data)	This study explored the relationship between corporate culture, environmental innovation, and financial performance. Environmental innovation can increase the firm's financial performance.
Fiordelisi et al. (2019)	Upper Echelons Theory, Competing Values Framework (Textual Analysis)	Firms with a creativity-oriented corporate culture are associated with higher levels in innovation.
Klemens et al. (2019)	Upper Echelons Theory, Strategy Theory, Leadership Theory (Prior Literature Study)	CEOs can shape the corporate technology orientation and IT function by getting involved and asking the right set of questions. Partnering with CIO is critical.

Literature Review Summary

A cross-cutting theme emerges amongst the literature with theories such as upper echelons theory and leadership theory that have been used to dissect and provide new knowledge to better understand leadership influence on organizational outcome. When looking at the existing literature, many facets ought to be considered to empirically explain leadership influence and the various stimulating factors (e.g., willingness to change, reporting relationships, and political orientation) and its effects on technology innovation performance.

Furthermore, prior research has not yet agreed on one empirical method to measure technology innovation performance, and leadership influence, which leaves room to further explore measures and construct design to fine-tune theory and apply it.

Finally, prior literature paid some attention to cultural values and ethical groups found in different countries. The ethical behavior of the CEO and the workforce itself varies from country to country. Because of that, it is important to apply the leadership theory and upper echelons theory to consider the ethnical realities and its influence on the workforce and leadership culture.

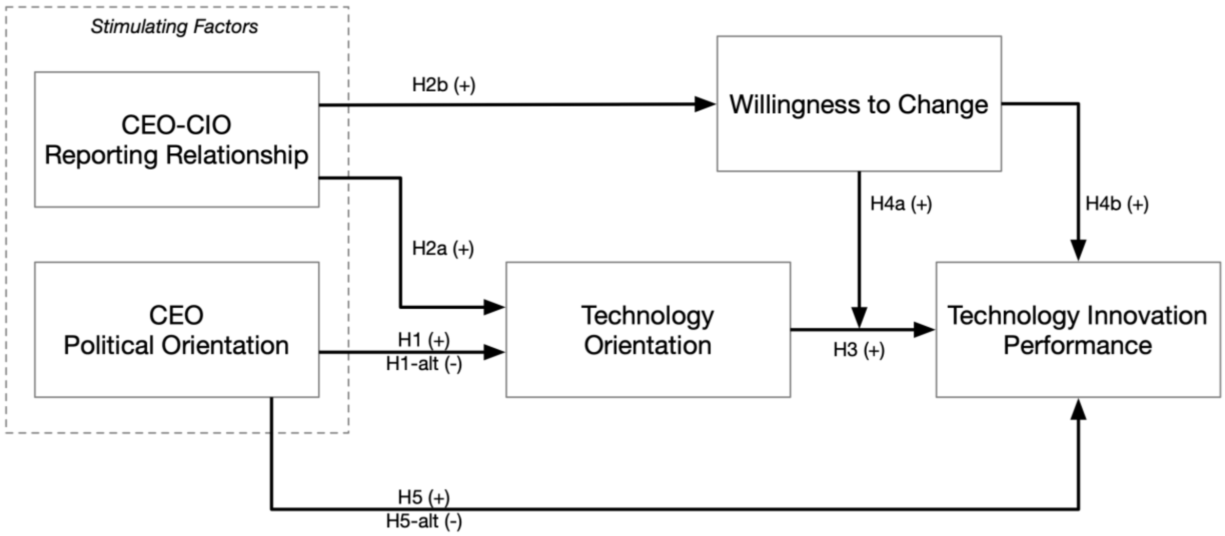
Research Model and Hypotheses Development

Figure 1 depicts the hypothesized research model for this study. This study took the approach to testing the relationships between the CEO's political orientation, the CEO-CIO reporting relationship, and the effects on technology orientation and its mediating influence on corporate technology innovation performance. Furthermore, this study examined the strength of the moderating effects by the employees' willingness to change on the relationship between technology orientation and technology innovation performance.

The control variables are the CEO's age, tenure, gender, duality (CEO has board seat), and the number of direct reports. The firm age, industry, and firm size are added as additional control variables.

Figure 1

Research Model



CEO's Political Orientation and Technology Orientation

Technology orientation is often associated with a firm's ongoing commitment to R&D, and its ability and willingness to adopt new technology and frameworks and applications that are trend-aligned and competitive (Gatignon & Xuereb, 1997; Halac, 2015). Technology orientation plays a significant role in technology innovation, but the relationship between the CEO's political affiliation and technology orientation have not yet been examined (Humphreys et al., 2005). The political orientation of the CEO influences corporate culture (Fiordelisi et al., 2019) and exerts direct influence on the innovation culture and internal processes necessary to innovate disruptively and sustainably for the benefit of a competitive market position with innovative technology (Aghion et al., 2013; Fiordelisi et al., 2019; Humphreys et al., 2005; Zaman et al., 2020).

The technology orientation sets the foundation for corporate innovation behavior from a cultural perspective and provides a “safe haven” for employees to think outside the box and innovate rapidly and competitively (Drucker, 1998; Gatignon & Xuereb, 1997; Humphreys et al., 2005). The speed with which technology innovation can occur can depend on the technology orientation itself. Corporate culture oriented towards vendor solutions might experience less opportunity to change rapidly versus a company with a technology orientation of home-grown innovative technology and applications that lend themselves to rapid change and adoption to market change (Fiordelisi et al., 2019; Zaman et al., 2020). Since the technology orientation is dependent upon the corporate culture and internal views and motivation of the employees, plus the external influence of politics (Chin & Semadeni, 2017), this study hypothesizes the following from both perspectives, liberal and conservative:

Hypothesis 1 (H1). The CEO’s liberal political orientation will have a positive influence on technology orientation.

Hypothesis 1-alternate (H1-alt). The CEO’s liberal political orientation will have a negative influence on technology orientation.

This study proposes an alternative hypothesis H1-alt to measure a negative influence of the liberal political orientation of the CEO on technology orientation when liberal levels are lower and are more on the conservative side.

The Effects of the CIO-CEO Reporting Relationship

Prior research challenged the traditional assumption that the CIO reporting relationship is determined by the IT strategy and that it should primarily be in support of the firm’s strategic positioning (Banker et al., 2011). The same is true for the firm’s technology orientation, which should also be in support of the firm’s strategic positioning (Gatignon & Xuereb, 1997). A successful CEO-CIO reporting relationship “seems to be linked to a shared vision of the role of IT as an agent of transformation” (Feeny et al., 1992, p. 435) and with the proper support of the CEO can have significant influence on the firm’s strategic positioning (Krotov, 2015).

Some prior research measured the probability of the existence of the CEO-CIO reporting relationship by examining the strategic position and the delta between operating income and sales (Banker et al., 2011). However, this study will depend upon a concrete identification of the existence of the CEO-CIO reporting relationship and applies a binary variable to capture whether the CIO reports to the CEO (binary value of “1”) or if the CIO does not report to the CEO (binary value of “0”).

For the CIO to meet the CEO’s expectations, the CIO will depend on the CEO’s support for technology projects and key initiatives to increase short- and long-term innovation performance. Therefore, it is imperative to the success of innovation for both, the CEO and the CIO, to communicate effectively and build a shared understanding of priorities in technology execution towards a shared vision (Johnson & Lederer, 2007). The shared vision aspect between the CEO and the CIO and its effects on technology orientation have not yet been examined previously and require a more in-depth understanding. Therefore, this study extrapolates to hypothesize that:

Hypothesis 2a (H2a). The existence of a CEO-CIO reporting relationship will have a positive influence on corporate technology orientation.

Hypothesis 2b (H2b). The existence of the CEO-CIO reporting relationship will have a positive influence on the employees’ willingness to change.

Technology Orientation and Technology Innovation Performance

Configuration theory describes an organization's configuration to establish a specific gestalt in favor of strategic positioning of itself for purposeful technology innovation (Stock & Zacharias, 2011). The configuration by the corporate culture for a specific technology orientation presents a unified theme for the organization to follow and adhere (Meyer et al., 1993).

Technology orientation as part of the organization's strategic orientation can lead to breakthrough innovation when executed by a creative or market-competitive corporate culture (Fiordelisi et al., 2019; Zhou et al., 2005). Firms with higher technology orientation experience higher gains financially and a higher internal perception of innovation success, when technology changes rapidly "because they are able to introduce new processes, products and services to satisfy customer needs" (Al-Ansari et al., 2013, p. 8). Furthermore, this study recognizes that a higher technology orientation is often a result of creative and market-oriented cultures that embrace change as an opportunity to innovate rapidly (Fiordelisi et al., 2019; Stock & Zacharias, 2011; Venus et al., 2018).

Companies that depend on organic innovation with increased levels in competitiveness must have a strong technology orientation (Gatignon & Xuereb, 1997). The inner workings of technology orientation do depend on a multi-dimensional structure, including top management capability, technological capability, commitment to learning new knowledge, and the commitment to change in response to changing market conditions (Halac, 2015). When all these factors come together in an organization, the firm's technology innovation performance increases. Hence, this study hypothesizes that:

Hypothesis 3 (H3). Technology orientation will have a positive influence on the firm's technology innovation performance.

The Moderating Effects of Corporate Willingness to Change

The corporate willingness to change supports the view of the employees and leadership to embrace change in conjunction with industry trends in technology innovation. Because of that, the organization can then to take full advantage of disruptive technology in favor of competing effectively on a firm level to increase firm performance and technology innovation performance (Metselaar, 1997; Miake-Lye et al., 2020; Venus et al., 2018).

Cultural views on reality and cultural behavior towards technology innovation are determinants of firm-level performance on technology innovation. In the 2019 research by Fiordelisi et al., four distinct types of corporate cultures were defined in a common competing values framework (CVF). These types are clan, hierarchy, adhocracy, and market. Adhocracy and market culture types are more prone and accepting to change, versus clan and hierarchy types which are more focused on cost control and stability. This is defined by the flexibility and discretion of each culture type regarding the acceptance of change. Depending on the type of corporate culture, cultural acceptance to change can have a significant presence for adhocracy and market types, but be less significant for clan and hierarchy culture types (Fiordelisi et al., 2019).

Additionally, the willingness to change on a corporate level depends on how much change is embraced as a means to succeed (Venus et al., 2018). Communication of change is essential throughout the corporate environment and is often done by the CEO who carries the vision of the future and can best provide guidance as to what this change will mean for the organization and each individual (Miake-Lye et al., 2020; Patelli & Pedrini, 2015; Venus et al., 2018; Yuan et al., 2019; Zaman et al., 2020). Because of the importance for an organization to embrace change, this study hypothesizes that:

Hypothesis 4a (H4a). Corporate willingness to change will positively moderate the influence of technology orientation on technology innovation performance.

Hypothesis 4b (H4b). Corporate willingness to change will have a positive effect on technology innovation performance.

CEO's Political Orientation and Innovation Performance

Innovation is at the forefront of corporate news and the Big Tech agenda world-wide (Foer, 2020). Much time is given to understanding what exactly precipitates the effects on corporate innovation performance in technology. Often times, corporate executive leadership and the leadership style are being examined as crucial indicator and significant predictor to technology innovation success (Zaman et al., 2020). People read about innovative CEOs in the news and naturally assert their persona and leadership presence as the significant ingredient for their respective corporate success in technology innovation. Well known CEOs, such as Elon Musk (Tesla and SpaceX), Mark Zuckerberg (Facebook), Jack Dorsey (Twitter) and Bill Gates (Microsoft), are associated as the corporate innovator, and the public observes them as the driver of technology innovation (Hjartar et al., 2019). But this might not be the only observed reason as to why some corporations have higher values in technology innovation performance than others. Further, this study examines the epistemology on how the CEO looks upon the world and what unique views the CEO does bring into the organization. The CEO's political views are an essential ingredient to how the CEO perceives the world and what strategic decisions and strategic alliances should exists to further those political views on the premise of corporate sustainability (Francis et al., 2012; Hjartar et al., 2019; Hu et al., 2017). To ensure the study remains impartial and devoid of any political party bias, this study seeks to test the influence of the CEO political orientation on technology innovation performance, from both perspectives, liberal and conservative. Hence, this study hypothesizes that:

Hypothesis 5 (H5). The CEO's liberal political orientation will have a positive influence on technology innovation performance.

Hypothesis 5-alternate (H5-alt). The CEO's liberal political orientation will have a negative influence on technology innovation performance.

Should this study find lesser levels of liberalism of the CEO, this study could exert a more conservative orientation of the CEO and its potential negative effects on technology innovation performance.

Methods

Data and Sample Collection

This study collected data via an online structured survey from US-based companies and multinational firms operating in the United States. The population of this study includes:

- (1) companies with an HRM (Human Resources Management), and
- (2) with an HRM manager tenure in the firm with a at least 2 years of experience.

The minimum of two years of experience as a human resources manager is chosen to ensure that the respondent has clarity and knowledge on the issues addressed in the survey. Based on prior research, managers "are good informants concerning that leadership because of their direct contact with CEOs" (Waldman et al., 2001, p. 136). Surveying data from human resources managers provided adequacy for this study as validated previously by Huselid & Becker (2000) in support of a common method in HRM studies (Dalakoura, 2010). Based on findings by Dalakoura (2010), it is also important to reflect that HRM professionals do have a detailed understanding of the corporate employee domain, organizational reporting structures, internal politics and cultural conditions (Waldman et al., 2001).

HRM has corporate ownership of the talent acquisition strategy and approves of internal and external initiatives to manage the corporate culture for all employees and has a good observation and understanding of the company's political involvement and cultural viewpoints and tendencies amongst the employees. Thus, HRM employees provide an ideal go-to point to solicit information about corporate culture and leadership orientation in regard to politics and cultural orientation towards technology and the willingness to change on an employee level (Becker & Gerhart, 1996). Furthermore, HRM has insight into employee satisfaction and job performance, which is an ideal source of data for measuring the perception of the CEO's reflection (verbally and by actions supported) on the technology vision and technology innovation satisfaction. Oftentimes, the CEO reflects verbally on the company's technology innovation performance and technology orientation in shareholder and employee communication, which reaches all employees (including HRM resources) (Hambrick, 2007; Patelli & Pedrini, 2015; Schwartz et al., 2005).

A structured online Qualtrics survey was administered to collect a total of 256 completed survey responses to ensure proper analysis power using the power calculator by Soper (2022). According to the priori sample size calculator for structural equation modeling by danielsoper.com (Soper, 2022), 250 samples are recommended to detect an effect, given the number of latent and observed variables and an anticipated effect size of 0.3 with a probability level of 95%.

The online survey was hardened by establishing content validity based on existing research methods by Al-Ansari et al. (2013). A pilot study (n=25) was administered to an initial set of HRM managers to assess reliability and construct validity and test for coefficient alphas above 0.60 (Al-Ansari et al., 2013). Based on the pilot study findings, the survey was fine-tuned to ensure it can be completed in around 10 minutes to avoid survey fatigue amongst the desired respondents. The finalized online survey was then sent to the remaining participants (*n*=226) for a total of 256 completed responses. To maintain a representative sample for the study, proven methods for determining the final samples were followed, a technique used in previous HRM related studies (Katou & Budhwar, 2006; Shen et al., 2018).

All the collected survey responses were reviewed by an expert panel of researchers consisting of at least two academic reviewers and two industry expert reviewers by Qualtrics LLC. Most of the survey questions originated from prior research, including proposed scales. Mixed scales were converted to one coherent 7-point Likert scale for concise analysis. The study conducted a factor analysis to properly test and fine-tune the underlying survey structure. The Cronbach alpha indices was leveraged for all scales with a lower limit target of 0.70 (Nunnally, 1978). Finally, a confirmatory factor analysis with partial least squares structural equation modeling (PLS-SEM) was developed.

Sampling and Procedure

A structured online survey was administered by a third-party external Qualtrics LLC research panel to collect data from HRM human resources managers. An initial pilot survey was administered to 20 human resources managers from 20 different companies matching the control company size of a minimum of 100 employees. This initial set of data was used to examine the average and standard deviation for each of the administered factors for the research model. The initial loadings were satisfactory with less of 0.03 variance between each factor (Hair et al., 2021).

The final set of data was collected via a Qualtrics quantitative online survey to an additional 236 human resources managers across 236 different firms with at least 100 employees each, totaling a complete sample size of 256 human resources managers used for SEM analysis.

To control for common method bias, participants anonymity was preserved along with simplicity in language geared towards human resources managers. Furthermore, the study controlled for method variance by inserting a marker variable in the online survey. The marker variable was not related to any of the factors and helped test for common method bias and non-responsive bias (Al-Taie et al., 2014; Bhaskar & Paulina, 2016).

Measures

Given the extensive literature available on the various variables chosen and other prominent studies, the scale items for the survey were carefully chosen to take advantage of prior measure validity. An additional single item measure was added to the 3 questions' CEO Political Orientation factor to the CEO's political tendency (Bixter, 2015). Unlike previous studies, a single item measure was introduced to capture concisely the CEO-CIO reporting relationship. Compared to some applied prior research techniques, this study targeted a more empirical technique of measuring the existence of the CEO-CIO reporting relationship by surveying the organization's HRM manager directly. For the confirmatory factor loadings analysis, the study has targeted a Cronbach alpha indices of no less than 0.7 for each construct. This is essential to properly assess the construct measurements (Al-Ansari et al., 2013; Dalakoura, 2010). Table 7 shows the sections of the survey and the number of survey items.

Table 7

Questionnaire Content

Subjects	# of items	References
CEO Political Orientation	3	(Bixter, 2015; Choma et al., 2009)
CIO-CEO Reporting Relationship	1	1 new item
Technology Orientation	4	(Al-Ansari et al., 2013)
Willingness to Change	3	(Dayan et al., 2016)
Technology Innovation Performance	3	(Zaman et al., 2020)
Control Variables	8	(Bhaskar & Paulina, 2016; Fiordelisi et al., 2019)
Total Items:	22	

CEO Political Orientation

To assess the CEO’s political affiliation, a new scale was developed to assert the political affiliation based on observations by the HRM director (Patelli & Pedrini, 2015; Schwartz et al., 2005) as exerted internally by the CEO to the organization. A three part questionnaire was used with a 7-point-Likert scale to assert the CEO’s perceived tendencies regarding political orientation (Bixter, 2015; Choma et al., 2009). The Cronbach’s alpha was 0.883.

Table 8

CEO Political Orientation Items

ID	QUESTION	CHOICES
LIB1	Our CEO tends to be liberal in terms of general outlook.	Strongly Disagree(1),2,3,Neither Disagree nor Agree(4),5,6,Strongly Agree(7)
LIB2	Our CEO tends to be liberal in terms of social policy.	Strongly Disagree(1),2,3,Neither Disagree nor Agree(4),5,6,Strongly Agree(7)

LIB3	Our CEO tends to be liberal in terms of economic policy.	Strongly Disagree(1),2,3,Neither Disagree nor Agree(4),5,6,Strongly Agree(7)

CEO-CIO Reporting Relationship

Prior research inferred the CEO-CIO reporting relationship by examining the long-term corporate stock gains with a combination of sales and operating expenses company-wide. This measure led to a threshold ranking between the values of 1…0 and presented a gap in certainty of empirically determining the existence of the CEO-CIO reporting relationship. Because of the importance of the CEO-CIO reporting relationship measure in our model, it is essential to have absolute certainty in this measure. For this reason, this study included a single item question to empirically measure the existence of the CEO-CIO reporting relationship.

Table 9

CEO-CIO Reporting Relationship Items

ID	QUESTION	CHOICES
CEOCIO	Does the CIO report directly to the CEO?	Yes, No

Technology Orientation

Technology orientation was measured via a 5-items scale based on prior research by Al-Ansari et al. (2013). The technology orientation measure reported proper reliability with a Cronbach's alpha of 0.892.

Table 10

Technology Orientation Items

ID	QUESTION	CHOICES
TO1	Our firm's policy is to adopt up-to-date technologies.	Strongly Disagree(1),2,3,Neither Disagree nor Agree(4),5,6,Strongly Agree(7)
TO2	Our firm often is the first to try out new methods and technologies.	Strongly Disagree(1),2,3,Neither Disagree nor Agree(4),5,6,Strongly Agree(7)
TO3	Our firm frequently improves internal processes such as speed, reliability, and information management.	Strongly Disagree(1),2,3,Neither Disagree nor Agree(4),5,6,Strongly Agree(7)
TO4	Our firm invests in latest technologies to stay on the cutting edge of innovation.	Strongly Disagree(1),2,3,Neither Disagree nor Agree(4),5,6,Strongly Agree(7)

Willingness to Change

The willingness to change measure followed closely a prior research scale on the commitment to change (Dayan et al., 2016) with a 3-items scale. For each question, the word "Manager" was renamed to "Employees" to suit the view of the human resources professional answering the survey questions. The questionnaire was deployed with a 7-point Likert-scale ranging from 1 = *Strongly Disagree* to 7 = *Strongly Agree*. The Cronbach's alpha was 0.829.

Table 11

Willingness to Change Items

ID	QUESTION	CHOICES
WTC1	Employees are ready to take on any new challenges that our firm faces.	Strongly Disagree(1),2,3,Neither Disagree nor Agree(4),5,6,Strongly Agree(7)

WTC2	Employees are generally open to trying new things for our firm.	Strongly Disagree(1),2,3,Neither Disagree nor Agree(4),5,6,Strongly Agree(7)
WTC3	Employees are generally fascinated by novel ideas.	Strongly Disagree(7),6,5,Neither Disagree nor Agree(4),3,2,Strongly Agree(1)

Technology Innovation Performance

The technology innovation performance measure was based on prior research with a 3-items scale, using a 7-point Likert scale ranging from 1 = *Strongly Disagree* to 7 = *Strongly Agree*. The Cronbach alpha indices were 0.817 for this measure and a composite reliability of 0.891, above the recommended value of 0.7 (Zaman et al., 2020).

Table 12

Technology Innovation Performance Items

ID	QUESTION	CHOICES
TIP1	Our products are of state-of-the-art technology.	Strongly Disagree(1),2,3,Neither Disagree nor Agree(4),5,6,Strongly Agree(7)
TIP2	Compared with our competitors, our product innovations have more success.	Strongly Disagree(1),2,3,Neither Disagree nor Agree(4),5,6,Strongly Agree(7)
TIP3	Compared with our competitors, our product modifications and innovations have a better market response.	Strongly Disagree(1),2,3,Neither Disagree nor Agree(4),5,6,Strongly Agree(7)

Control Variables

As shown in Table 13, this study controlled for the organizational size of the organization with a minimum of 100 employees and the primary industry of the organization in technology research and software development. The organizational size was measured as the logarithm of the number for the total employees (Dalakoura, 2010).

Additionally, this study controlled for CEO years employed, CEO gender, CEO age, CEO technology experience, and CEO technology-related academic degree for the construct of technology orientation (TO). Technology innovation performance (TIP) was controlled with company age, company size, and industry sector.

Table 13

Additional Control Variables

ID	QUESTION	CHOICES
CEO_AGE	Approximately, how old is the CEO?	Under 18,18-24,25-34,35-44,45-54,55-64,Above 64
CEO_YEARS_EMPLOYED	How many years has the current CEO been employed as the CEO with your company?	Under 1,1-3,4-6,7-9,10-12,13-15,Above 15
CEO_DIRECT_REPORTS	How many direct reports does the CEO have?	Under 4,4-6,7-9,10-12,13-15,16-20,Above 20
COMPANY_AGE	How many years has the company been in business?	Under 5,5-10,11-20,21-30,31-40,41-50,Above 50
CEO_GENDER	What's the CEO's gender?	Male, Female, Other
QR_INDUSTRY	What's your industry?	Manufacturing,Technology,Health care,Insurance,Financial,Aviation, Research,Gastronomy,Food and Restaurant, Other
QR_COMPANY_SIZE	How many employees does your company have?	Under 50,50-99,100-199,200-299,300-399,400-500,Above 500

Analysis

This study leveraged the partial least squares structural equation modeling (PLS-SEM) method using the desktop-based software tool SmartPLS version 4.0.8.2 for full analysis. SmartPLS provided a two-procedure calculation method for Bootstrapping and PLS algorithm statistical modeling of the data to assess the proposed relationships between the various model factors. Bootstrapping was used to test statistical significance of PLS-SEM results, including path coefficients, outer weights, Cronbach's alpha, HTMT, and R-squared values and executed initially with the recommended amount of subsamples of 5000 to examine the model's hypothesized relationships (Hair et al., 2017). SmartPLS's PLS algorithm was used to examine discriminant validity of the factors, outer loadings, and general model fit in accordance with the recommended technique by the statistical software manufacturer SmartPLS ("PLS-SEM Algorithm," 2022).

Results

The exploratory factor analysis (EFA) has been used with a varimax rotation to properly examine the factor structures and outer weight loadings. All observed factors loaded significantly and together provide adequate loadings in relation to each other. The CEO-CIO factor was excluded from the varimax rotation as it is a single item factor with a fixed loading of 1.000.

As depicted in Table 14 and Table 15, all measured factors have an inner consistency with a composite reliability above 0.8 and a convergent validation assessment with an AVE above 0.5 (Fornell & Larcker, 1981). An AVE over 0.50 will result in more than 50% of the variance and the indicator will be included in the statistical modeling (Zaman et al., 2020). All factor loadings are higher than the recommended benchmark of 0.7, which reflects adequate reliability (Fornell & Larcker, 1981; Zaman et al., 2020).

Table 14

Rotated Factor Matrix with AVE

	CEO Political Orientation *AVE=0.811*	**CEO-CIO Reporting** *AVE=1.000*	**Technology Innovation Performance** *AVE=0.732*	**Technology Orientation** *AVE=0.712*
LIB1	0.919			
LIB2	0.922			
LIB3	0.859			
TIP1		0.856		
TIP2		0.860		
TIP3		0.850		
TO1			0.832	
TO2			0.848	
TO3			0.856	
TO4			0.840	
WTC1				0.900
WTC2				0.860
WTC3				0.830

Table 15

Measurement Model Assessment

Construct	Items	Loadings
CEO-CIO Reporting Relationship *(Cronbach's alpha = 1.000; Composite reliability = 1.000; Average variance extracted (AVE) = 1.000)*		
Does the CIO report directly to the CEO?	CEOCIO	1.000
CEO Political Orientation *(Cronbach's alpha = 0.883; Composite reliability = 0.893; Average variance extracted (AVE) = 0.811)*		
Our CEO tends to be liberal in terms of general outlook.	LIB1	0.919
Our CEO tends to be liberal in terms of social policy.	LIB2	0.922
Our CEO tends to be liberal in terms of economic policy.	LIB3	0.859
Technology Orientation *(Cronbach's alpha = 0.865; Composite reliability = 0.866; Average variance extracted (AVE) = 0.712)*		
Our firm’s policy is to adopt up-to-date technologies.	TO1	0.832
Our firm often is the first to try out new methods and technologies.	TO2	0.848
Our firm frequently improves internal processes such as speed, reliability, and information management.	TO3	0.856
Our firm invests in latest technologies to stay on the cutting edge of innovation.	TO4	0.840
Willingness to Change *(Cronbach's alpha = 0.829; Composite reliability = 0.831; Average variance extracted (AVE) = 0.746)*		
Employees are ready to take on any new challenges that our firm faces.	WTC1	0.900
Employees are generally open to trying new things for our firm.	WTC2	0.860
Employees are generally fascinated by novel ideas.	WTC3	0.830
Technology Innovation Performance *(Cronbach's alpha = 0.817; Composite reliability = 0.818; Average variance extracted (AVE) = 0.732)*		
Our products are of state-of-the-art technology.	TIP1	0.856
Compared with our competitors, our product innovations have more success.	TIP2	0.860
Compared with our competitors, our product modifications and innovations have a better market response.	TIP3	0.850

Table 16 shows the descriptive statistics for all measures, including minimum and maximum range for each factor, MEAN, and STDEV. This study also checked for inner consistency (reliability) for all constructs. Table 17 shows Cronbach's alpha ranging between 0.817 to 0.883, which is greater than 0.7 and therefore statistically significant (Nunnally, 1978).

Table 16

Descriptive Statistics

	Mean	Std. Deviation
LIB1	4.37	1.965
LIB2	4.68	1.778
LIB3	4.58	1.851
TO1	5.40	1.769
TO2	5.14	1.722
TO3	5.35	1.574
TO4	5.39	1.472
WTC1	5.44	1.487
WTC2	5.54	1.442
WTC3	5.29	1.567
TIP1	5.34	1.596
TIP2	5.47	1.357
TIP3	5.46	1.427

Table 17

Construct Reliability and Validity

	Cronbach's alpha	**Composite reliability (rho_a)**	**Composite reliability (rho_c)**	**Average variance extracted (AVE)**
CEO Political Orientation	0.883	0.893	0.928	0.811
Technology Innovation Performance	0.817	0.818	0.891	0.732
Technology Orientation	0.865	0.866	0.908	0.712
Willingness to Change	0.829	0.831	0.898	0.746

Table 18 depicts the composite reliability for all used measures in this study. Table 19 shows the results of the discriminant validity (Fornell & Larcker, 1981) to validate construct correlations. The CR for all construct is above 0.7 and the AVE values are within 0.712 and 0.811. Fornel & Larcker (1981) was used to compare the square root of each AVE in the diagonal with the correlation coefficients for each construct (Ab Hamid et al., 2017). This study accepts the discriminant validity for the measurement model.

Table 18

Composite Reliability (RHO_C) for All Used Measures

Measure	**Original sample**	**Sample mean**	**Standard deviation**	***t*-statistics**	***p*-values**
CEO Political Orientation	0.897	0.908	0.030	29.858	0.000
CEO-CIO Reporting Relationship	1.000	1.000	0.000	0.000	0.000
Technology Innovation Performance	0.818	0.819	0.026	31.848	0.000
Technology Orientation	0.866	0.867	0.017	51.917	0.000
Willingness to Change	0.831	0.833	0.025	33.497	0.000

Table 19

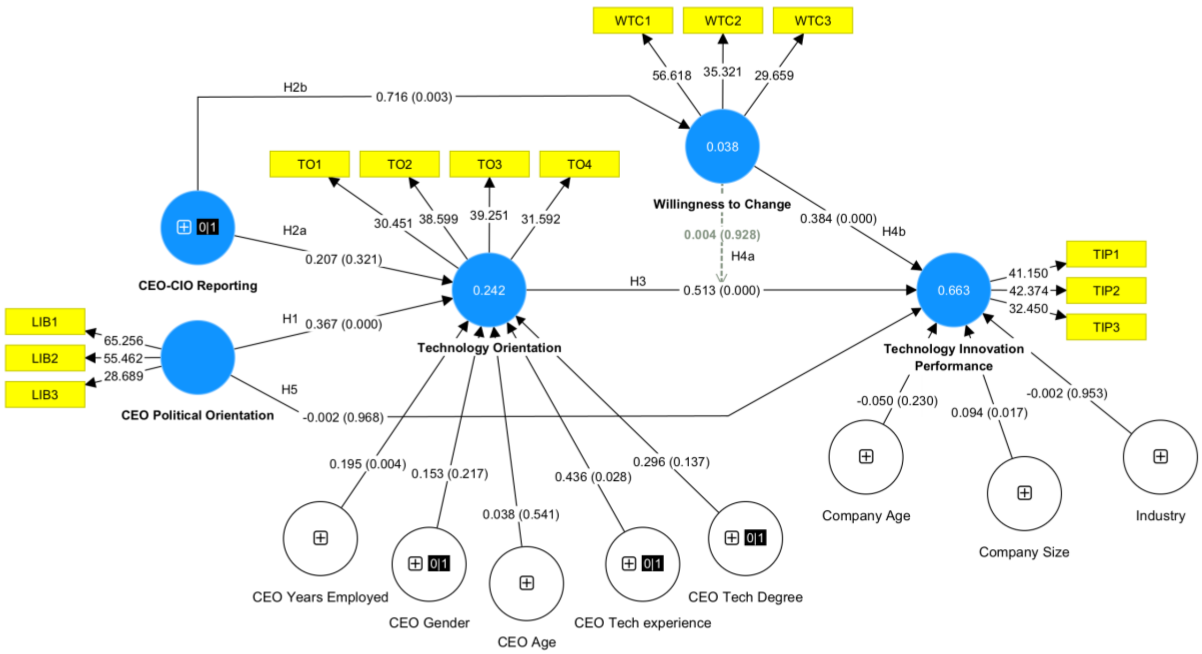
Discriminant Validity – Fornell-Larcker Criterion with CR, AVE

	CR	**AVE**	**A**	**B**	**C**	**D**	**E**
CEO Political Orientation **(A)**	0.928	0.811	0.901				
CEO-CIO Reporting Relationship **(B)**			-0.028	1.000			
Technology Innovation Performance **(C)**	0.891	0.732	0.337	0.132	0.855		
Technology Orientation **(D)**	0.908	0.712	0.397	0.063	0.749	0.844	
Willingness to Change **(E)**	0.898	0.746	0.320	0.194	0.694	0.600	0.864

This study used the PLS-SEM bootstrapping feature to evaluate the moderating effect of willingness to change on the relationship between technology orientation and technology innovation performance (t-value = 0.090; p = 0.928), as depicted in Figure 2.

Figure 2

Structural Model of Technology Innovation Performance



As seen in Table 20, because the reported t-statistic is below the recommended 1.96 (Hair et al., 2021), and the effect size ($f^2 = 0.000$) is below the minimum recommended value of 0.02 to indicate a small effect size (Aguinis et al., 2005), this study cannot validate a significant moderating effect of the employees' willingness to change. Therefore, hypothesis H4a is not statistically significant.

As seen in Table 20, the most significant effects to technology innovation performance are measured by technology orientation ($ß = 0.513$; $p < 0.000$). Therefore, hypothesis H3 is statistically significant. The willingness to change and its effects on technology innovation performance ($ß = 0.384$; $p < 0.000$) is statistically significant and validates hypothesis H4b. The CEO's political orientation and its contribution to technology orientation ($ß = 0.367$; $p < 0.000$)

is significant and validates hypothesis H1. H1-alt is statistically not significant as no negative values were found for this hypothesis in this study. The effect of the CEO-CIO reporting relationship on technology orientation (*ß* = 0.207; *p* = 0.321) is not significant, therefore H2a is not statistically significant. However, the CEO-CIO reporting relationship does show significant effects on the employees' willingness to change (*ß* = 0.716; *p* =0.003) and thus hypothesis H2b is statistically significant. Finally, the effects of the CEO political orientation on technology innovation performance (*ß* = -0.002; *p* = 0.968) are not significant and because of that, hypothesis H5 and H5-alt are not significant. Figure 3 shows the significant hypotheses paths.

Table 20

Summary of the Structural Model

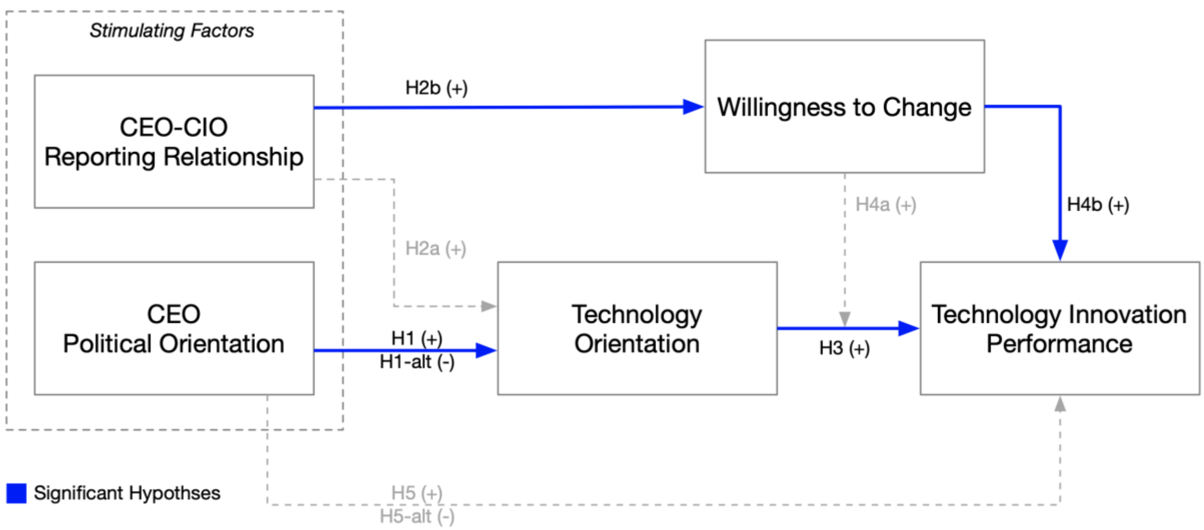
	Constructs	***ß***	***t*-Values**	***p*-Values**	***F²***	***R²***
H1⁺ H1-alt	CEOPO → Technology Orientation	0.367	5.803	0.000	0.168	0.242
H2a	CEOCIO → Technology Orientation	0.207	0.993	0.321	0.004	
H2b⁺	CEOCIO → Willingness to Change	0.716	2.971	0.003	0.039	0.038
H3⁺	TO → Technology Innovation Performance	0.513	7.310	0.000	0.456	0.663
H4a	TO * WTC → Technology Innovation Performance	0.004	0.090	0.928	0.000	
H4b⁺	WTC → Technology Innovation Performance	0.384	5.751	0.000	0.256	
H5 H5-alt	CEOPO → Technology Innovation Performance	-0.002	0.040	0.968	0.000	

Note. *Refers to interaction term. ⁺Refers to significant hypotheses.

WTC refers to Willingness to Change. CEOPO refers to CEO Political Orientation. CEOCIO refers to the CEO-CIO Reporting Relationship. TO refers to Technology Orientation.

Figure 3

Significant Hypotheses Diagram



Discussion

Principal Findings

This study finds that the CEO's political orientation does influence the company's technology orientation. In particular, the CEO's political tendency towards liberalism has higher effects on technology orientation. Since negative effects of the CEO liberal orientation have not been detected, this study suggests that liberal CEOs tend to influence positively the company's technology orientation whereas less liberal CEOs exert lesser influence on technology orientation, which in this study's research model would lead to lower levels in technology innovation performance.

This study did not find significance in the existence of a CEO-CIO reporting relationship. To the contrary of previous study methods and techniques to identify empirically the existence of the CEO-CIO reporting relationship (Banker et al., 2011), which examined financial and technology patent data to excerpt such relationship, this study went straight to the true record of corporate organizational reporting relationships, the HRM professional, and inquired about the reporting relationship for the CIO. Although prior research did find correlation between the CEO-CIO reporting relationship and higher levels in technology innovation performance, in regards to the organizational levels in competitiveness (Banker et al., 2011), this study could not produce significant evidence that a CEO-CIO reporting relationship positively influences technology orientation with its subsequent related effects on technology innovation performance.

This study method made use of a single item factor for empirically measuring the CEO-CIO reporting relationship (Hair et al., 2021; Sarstedt & Cheah, 2019). Unlike other SEM software tools, SmartPLS provides a proven mechanism to compute statistically a single-item factor in a SEM-PLS analysis. Future studies could potentially introduce more statistical variability of this relationship via PLS-SEM analysis by adding a multiple items factor for the CEO-CIO reporting relationship.

As observed in this study, the CEO-CIO reporting relationship does influence the employees' willingness to change. This finding presents a new understanding for academia and the professional corporate playing field on the criticality of the CIO directly reporting to the CEO and its resulting benefits to influence the organization for higher levels in its willingness to change (often referred to as agility in the corporate world). The ability for an organization to change on a dime and quickly adjust its course to meet competitive demands with strategic precision is an inherent benefit to technology innovation performance (Aghion et al., 2013; Stock & Zacharias, 2011).

Additionally, this study validated previous research findings of technology orientation positively influencing the organization's technology innovation performance (Al-Ansari et al., 2013; Zhou et al., 2005). The interesting finding here was that none of the control variables, such as CEO age, CEO tenure, and the CEO's professional expertise and experience in technology had any statistical significance to the construct of technology orientation. This finding suggests that technology orientation is merely influenced by leadership style, behavior, and viewpoints instead of obvious observed characteristics, e.g., tenure, education, and professional skills. Future scholarly research could further validate this potential phenomenon.

No moderating effects of the willingness to change on the relationship between technology orientation and technology innovation performance was found in this study. Although surprising, this result does add more weight to the idea that employees in the technology field are more vested in moving forward on the corporate platform of technology orientation to produce innovative technology versus focusing their efforts on changing the underlying corporate technology orientation. In other words, the results of this study could indicate employees are embracing their current technology orientation and not focusing on changing it. Future research could provide additional context to the underlying composite structures on the formulation of a particular technology orientation to draw new conclusions on any potential organizational moderating effects.

Finally, this study finds significant evidence that the employees' willingness to change increases the levels of corporate technology innovation performance. Organizations could leverage this finding to increase their internal efforts to accent and promote an agile culture that embraces change as an opportunity to innovate rapidly (Fiordelisi et al., 2019).

Potential Implications for Research

Existing literature has examined a plethora of factors that stimulate technology orientation and its potential effects on a variety of business performance factors. What continues to stand out is the combination of stimulating factors and its combined influence on technology orientation and the resulting performance characteristics of the organization.

The CEO-CIO reporting relationship needs to be better understood in its powers to steer top-level executive directive of the CEO and the associated effects on innovation performance, which ultimately influence the firm's financial performance downstream. Because of the power of this relationship, the relationship itself should be looked upon as a leveler of the board of directors to guide the CEO's primary directive towards a successful outcome in technology innovation (regardless of the company strategy being that in cost leadership or product differentiation) (Banker et al., 2011). The CEO-CIO reporting relationship should be at the forefront of strategic decision-making.

Additionally, the CEO's political orientation should be seen as another primary stimulant influencing the firm's reaction to market change and innovation opportunities. This study is the first to recognize the bi-directional factor of both the CEO-CIO reporting relationship and the CEO's political orientation and its combined interrelated stimuli on the entire organization. Political viewpoints and opinions influence the relationship itself. The health of the CEO-CIO reporting relationship can depend on mutual agreement between the CEO and the CIO and some common traits regarding technology experience and tech-related education. This study contributes to a new understanding of the phenomenon of combined stimulants in organizational leadership influence on technology innovation performance. Furthermore, this study provides a new way to measure the political orientation of the CEO by examining the perceived and observed liberal tendencies by employees – after all, employees build their perception of executive leaders that will influence their views on the future of the company and perceived job safety and job satisfaction (Sharp et al., 2017) – instead of looking at FEC filings of party contributions (Banker et al., 2011). This is important because some CEOs give to multiple parties to extend their professional network equally both ways. This could also be an effort to obfuscate their personal political orientation.

Finally, the organizations' willingness to respond favorably to the executive directive by the CEO and the CIO does depend on projection of the political orientation by both in regards to their tone with the organization (Hambrick, 2007; Waldman et al., 2001). This study provides the basis for subsequent research to apply the organizations' willingness to change (as directed by top-level executive leadership) as a moderating effect versus the traditional thinking of a mediating effect on firm performance factors.

Potential Implications for Practice

This study can be leveraged by the board of directors to assess proactively the relationship quality of the CEO and CIO to ensure optimal alignment with business strategy. More than that, this study builds awareness of the interconnectedness between the CEO's political preferences, the CEO-CIO relationship quality, and their combined influence on the organization's technology orientation with a view to fine-tuning the employee's willingness to respond to change favorably for the benefit of increasing technology innovation performance for companies with a strategic objective to lead as differentiator.

This study can be leveraged by HRM hiring managers and the board of directors to carefully probe potential CEO applicants – perhaps over more lengthy talks and interactions – on their levels of liberalism. Candidates for CEO with higher levels of liberalism will most likely influence the organization to accelerate and increase technology innovation performance and promote a healthier, agile culture with increased employees' willingness to change without increasing employee turnover as a consequence.

The employees' willingness to change is increasingly important for companies that must adjust course often and quickly to effectively compete in technology innovation. Advancements in technology are increasing rapidly each year and what separates the winners from the less fortunate is their ability to retain high levels of agility within their workforce. Adequate leadership reporting relationships in the upper echelon drive the underlying responses and motivations by the organization to accelerate technology innovation. Because of that phenomenon, it is essential for HRM leadership to think of ways to promote a healthy corporate agile culture that embraces change as a means to job satisfaction and job safety. Leaders can contribute tremendously to the employees' willingness to change by rewarding performance-based outcomes in regards to new technology innovation (Katou & Budhwar, 2006).

Conclusions

This study explored various relationships, CEOPO, CEOCIO, TO, and WTC, and their individual effects on technology orientation and consequent effects on technology innovation performance. In addition to prior research, the findings of this study provide new context on the effects of the CEO on the organization's technology orientation. Contrasting with prior studies (Banker et al., 2011), the findings of this study cannot validate the significance of the CEO-CIO reporting relationship and its effects on technology orientation and the subsequent effects of the CEO-CIO reporting relationship on technology innovation performance. Previous research often ties the CEO-CIO reporting relationship directly to the innovation performance.

However, we know from this study that a CEO-CIO reporting relationship influences critical areas of an organization that are needed to produce technology innovation. And those areas are primarily the employees. After all, technology innovation does not yet increase itself without the intervention and guidance of employees. The employees' willingness to change, their commitment to adopt new technology, and technology trends are influenced positively when the CIO reports directly to the CEO because of the employees' familiarity and interpretability of the innovation directive from leadership. It is the understanding, familiarity, and clarity on the chief technology directive that precipitates clarity in the primary innovation directive which increases technology innovation performance (Halac, 2015).

The CEO's political orientation significantly influences the organization's technology orientation. In particular, the CEO's liberal tendencies positively influence technology orientation, which increases the effects of technology innovation on technology innovation performance. This new understanding of the CEO's political orientation and its effects on the organization's performance is essential for future research to build upon and to build out to further enhance the underlying foundation of the importance of the CEO's political orientation to the company's bottom line.

Additionally, it does not appear that there is a statistically significant moderating effect of the employees' willingness to change on the relationship between technology orientation and technology innovation performance. This particular finding was unexpected due to findings in prior research on the topic of willingness to change and its effects on entrepreneurial orientation (Dayan et al., 2016), which is a strong indicator of technology innovation performance. However, this study finds a significant influence of the employees' willingness to change and its effects on technology innovation performance. This further validates the importance of this study and its chief takeaway that the influence on the employees is the critical simulating factor of technology innovation performance.

The findings of this study present interesting practical implications to the company board of directors, and the organizations' human resources hiring managers, in seeking to hire a CEO who increases the likelihood to promote higher levels in technology innovation performance. Furthermore, this study can be useful for human resources strategies to evaluate the reporting structure of the technology leader (CIO) to the CEO and its effect on the organization's ability to adopt to ever-changing market conditions with a view to accelerate technology innovation.

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