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The Digital Maturity of the Tunisian Boards of Directors

CONFIDENTIAL

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Mahmoud Mseddi

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Supervisors:
Professor Gerrit Sarens
Professor Youtha Cuypers

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UNIVERSITÉ CATHOLIQUE DE LOUVAIN
Louvain School of Management
Place des Doyens, 1 bte L2.01.01, 1348 Louvain-la-Neuve, Belgique | **www.uclouvain.be/lsm**

Foreword

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I. Introduction

"Digital maturity, not digital transformation" asserted Kane (2017). Digital transformation refers to the adoption of modern business practices and processes to help the organization cope with an increasingly digital environment: this takes into account the initiation of the involved technologies' adoption and their implementation: a concept that might appear to happen overnight. Maturity, on the other hand, is the extent to which an entity is able to respond to changes in an efficient manner. The gradual on-going developments that organizations undergo on their journey to digital maturity are never over as they start advancing towards it. While industrial revolutions are constantly re-shaping business models and improving operational efficiency, there is a growing risk arising from disruptive innovation for organizations, depending on the approach they are appropriating towards it. Simultaneously, the Board of Directors plays a catalysts' role in the decision-making and steering of the long-term strategy of the firm, with constant interactions with the top management. One can therefore argue that the influence they exert plays a heightened role in a conveying a vision revolving around the digital wave. Nonetheless, this leads us to ask: are boards digitally mature to face the new technological and innovative trends? We will try, throughout this exploratory research, to assess their level of awareness and initiative while discussing board behaviours when facing new paradigms. To answer this question, we shifted the focus to developing markets, and specifically to Tunisia, in order to probe transitional economies.

The literature review first sheds the light on the foregoing implied structural changes that industries are witnessing due to disruptive innovations and the adoption mechanisms it entices along with behavioural and strategic theories. A comprehensive evaluation of existing bibliography about the board of directors and its characteristics is also summarized, concluded

with a description of the Tunisian economy and governance bodies. Enterprise business technology governance (EBTG) is also covered in the review, with its main motives and current developments outlined, given that such practices might echo a certain degree of awareness within boards. The investigation will consist of a methodology part that outlines the course of action along its subsequent data collection while the cross-case mixed analysis will produce insight about the local business ecosystem and their behaviours. The sample has been chosen in a way to represent the Tunisian economical basis through the representation of the omnipresent company types. Finally, limitations to the investigation will be pointed out and further areas of research will be proposed.

II. Industry Evolution

1. Industry-Disruptive Technologies

Changes emerging from technological advancement have been shifting power, wealth and knowledge in the corporate environment (Xu, David, & Kim, 2018). The first industrial evolution initiated in 1760 with the advent of the steam machine revolutionized manufacturing processes, mainly of the textile, steel and chemicals industries (Landes, 1969).The rate of economic and social changes picked up, changing aspects of daily life and sustaining growth through innovations. The following industrial revolution starting in the late 19th century involved new stable power sources coupled with the invention of the combustion engine, which allowed the expansion of businesses and large-scale production systems and assembly lines. The Third Industrial Revolution witnessed starting from the 1960s was marked by the democratization of computing technology which digitalized manufacturing.

In each of these contexts, new technologies introduced innovative radical approaches to industries that created new markets and altered value chains while disrupting old ones. Those tools and concepts add another dimension to performance attributes that eventually penetrate established markets and become the new threshold for consumers (Christensen, 1997). Steamboats, for example, replaced traditional sailing after being used exclusively on inland waters. Digital photography quickly outpaced chemical photography, wiping out Kodak, a giant of the industry (Lucas & Goh, March 2009).

2. IT as a Disrupter

a. Implied Shifts

Information technology (IT) is picking up the evolution rate of the business world, contributing in supporting and evolving strategies and factors answering to a dynamic and fluctuating environment. The merge of physical, digital and biological barriers by technology has been described by Klaus Schwab as a 4th Industrial Revolution in itself and not only a continuity of the 3rd (Schwab, 2016). In this outlook, digital transformation is reshaping industries and creating new roles within organizations through cost reduction, increased automation and new informational architectures. IT's ubiquity and potency are supported by its role as a competitive advantage driver and its increasing strategic value (Carr, 2003). Although many aspects of new technologies have been commoditized, nowadays issues are more associated with developing an edge in improving capabilities and attracting customers. Company performance is now related to the extent to which operations are aligned with technological factors (Ko & Fink, 2010). As managers might have no control over the extent of the disruption generated by the fourth revolution, they are constrained to the prediction of future opportunities marked by the lower barriers between innovators and markets, the active role of artificial intelligence, the integration of processes, the improved life standards and the increased connection between business components (Xu, David, & Kim, 2018). Thus, digital transformation is no longer optional.

b. Intensive Competition

New operating models resulting from such maturation laid the groundwork for the accelerating competition dynamics within previously stagnating industries while opening up new IT-powered opportunities to exploit (McAfee & Brynjolfsson, 2008). Business models and processes have been improved by the abundance of technologies connecting supply chains,

facilitating the adoption of agile systems and optimizing them via predictive tools. Best practices initiated by industry leaders are quickly integrated directly into software or duplicated by competitors given their falling prices and increasing accessibility, adding intensity and dynamicity to the competition (Carr, 2003). Those technologies, coupled with the affluence and velocity of data, add new aspects to decision-making processes by initiating new ways of deduction and establishing new roles within the company (McAfee & Brynjolfsson, 2012).

c. Implications at the Top of the Organization

As per several surveys, more than 90% of executives and directors identify technology as important to their businesses (IT Governance Institute, 2011). Indeed, it has been established that data-driven companies successfully exploiting IT innovations have better performance measures (McAfee & Brynjolfsson, 2012). The same authors indicated that competition dynamics have shifted in every industry, with emphasis on the IT-intensive ones (media, music and telco industries, for example). That explains the recent rise expenditure on Informational Assets by companies, which is expected to reach $3.8 Trillion in 2019 (Gartner, 2019). C-suite executives and steering committees are more eager to outpace the competition, adding a strategic facet to IT expenses. Within this competitive structure where only the most successful IT exploiters manage to take off from the crowd, the risk associated with the operational and strategic dependence on business technologies hazardously increases (Lambert, 2017). A McKinsey & Company report stated that 17% of large IT projects go so badly that they threaten the existence of the company itself. Indeed, losses incurred from server crashes and attacks and compliance to regulations, for example, are increasing IT-related risk (Novak, et al., 2018). Parent & Reich (2009) laid out the five major risk areas related to technology that should be addressed in governance. According to them, IT risk can emanate from the directors' technological competences and knowledge, the

infrastructure (due internal and external threats), the implementation of new IT Projects changing the core processes of an organization, the business continuity cycle in respect of the company's stability in the environment and finally, the informational flows that can be breached with loose privacy policies.

During Pr. James Cash Jr.'s tenure at several large US companies' boards, he noticed four categories that director's expectations from the CIO and IT function fall into (2013). The first one being top growth generation, where directors expect that the potential use of new technologies (including infrastructure) will guarantee a certain competitiveness. The second category targets operational efficiency optimization, where identifying cost reduction prospects to smoothen the resource allocation for growth directives is considered. Effective corporate governance and controllership concerns emerging from the globalization and geographic distribution of the company due to digitalization are also pondered at the board level, taking into consideration countries' regulations. Finally, the degree of involvement of the IT function in strategy formulation is getting higher, no longer limiting it to the implementation process. Directors therefore envisage input from IT experts in setting the direction of the organization.

3. IT Adoption

All of the aforementioned arguments stress the need for a fundamental change based on new corporate technologies, despite Christensen's argument that a company might not see the need adapt an advancement given that it does not notice a demand from its customers since the beginning (Christensen, 1997). Implications are related to leaderships' vision, talent management and company culture, aside from the tools and decision-making processes (McAfee & Brynjolfsson, 2008). It also encourages the development of adaptation capabilities within firms in

order to adjust to shifting requirements (Teece, Pisano, & Shuen, 1997; Dreischmeier, Close, & Trichet, 2015). In the same model put forward by Lucas & Goh (March 2009), a companies' core rigidities and dynamic capabilities should also be balanced via management propensities (i.e. the strategy by which management responds to disruptive innovation) when reacting to transformational technologies. It is also emphasized that a company culture based on innovative behaviors and skills to face such disruptive paradigms should be adopted to reap its benefits (Burke, 2012). Proper transformation is said to occur when the right technology is leveraged "on the right process at the right time at the right costs" (Fenn & Raskino, 2008). Following this new agile framework, Andriole, Cox & Khin (2017) reported that the new pattern for IT implementation switched to *technology first/requirements second*, resulting in the hasty adoption of technologies as a reaction to the increasing pace of change in industries. That is explained by the high payoff (and concurrently high risk) of early adoption, which is often associated with leaders' best practices. The regulatory framework is also fast-changing, and organizations cannot negotiate governing powers, making the effect of such changes either stimulative or destructive (Deloitte, 2018).

Behavioral research regarding the adoption of IT is mainly based on theories such as the Diffusion of Innovation (DOI), the Theory of Reasoned Action (TRA) and the Technology Adoption Model (TAM) on the organizational level (AbdulHameed, Counsell, & Swift, 2012). Furthermore, from an individual behavioral side, the unified theory of acceptance and use of technology (UTAUT, Appendix A) put forward by Venkatesh et al. (2003) and applied to the workplace environment by Eckhardt et al. (2009) proved that personal tech adoption decisions in the professional context are heavily influenced by their superiors' social setting. Premkumar & Roberts (1999) also mentioned the top management's support and IT expertise as significant

adoption drivers. The UTAUT Model can also be helpful when assessing the governing body's factors influencing the organization at a larger scale.

Considering organizational characteristics, Subramanian & Nilakanta (1996) found out that the increased size, slack[1], high formalization and low specialization and centralization are associated with consistent technical innovation adoption. The authors also noted that these relationships differ depending on the type of innovation (technical vs. administrative). Orlando et al. (2018) identified diversification as an important driver of strategic slack and, therefore, innovation. The external environment is also known to affect such decisions, with factors such as competitive pressure, external pressure, government support and partners' support proven to be significant (Quaddus & Hofmeyer, 2007). In that respect, Filipescu et al. (2009) proposed a framework where internationalization and technology innovation are interdependent based on the knowledge needs for new markets penetration.

[1] Organizational slack was introduced by Cyert & March (1963) and is referred to as the valuable excess resources a company maintains that plays a stabilizing and adaptive role.

III. Board of Directors & Governance

1. Role of the Board of Directors

Board of Directors, by definition, is a panel of individuals elected with the sole purpose of representing shareholders in a company. Mace (1971) referred to the counseling, advising and disciplining roles vis-à-vis of the top-level executive management. As the first two roles are reflected by the company's reliance on the board for setting the strategic trajectory (Demb & Neubauer, 1992), Mace suggests that disciplinary action takes shape in the mechanisms and tools that regulate interactions from within and between the board and the executive side. The processes by which Chief Executive Officers (CEOs) are hired, assessed and if need, dismissed, along with reporting tools are examples of corrective actions that a company might resort to.

Within the scope of the emerging business driver's requirements, BoDs are known, among all entities, to exhibit the greatest potential impact on the behavior of a company and its direction (Huse, 2007). The Cadbury Report (1992) advanced a definition of Corporate Governance as a system to control and direct a company, while Tricker (1984) proposed that the main role of governance is to give an overall direction to the enterprise rather than running the business. Boards, as major directing bodies, are self-governed, independent entities (Fama & Jensen, 1983) which should fall in line with the shareholders' expectations. Indeed, by investing in certain shares, shareholders expect an increase in their value, which is translated into faith in a board's proficiency. Directors are therefore held accountable for their management of people's investment (Leblanc & Gillies, 2005). The authors also described a perceived link between effective governance processes and the overall performance of the company while presenting the decision-making process as a function of the board's behavioral attributes and competencies. In the wake

of the 2001 corporate scandals, governance concerns were brought forward, as the Sarbanes-Oxley act (2002)[2] and increasing commissions scrutiny shifted the main objectives of directors from striving for excellence to compliance with rules (Heidrick & Struggles, 2014). These developments also extended the focus on IT governance given the commoditization of informational tools (Brown & Grant, 2005). Weill & Ross (2004) concluded that the complexity and evolving nature of IT radically reformed the knowledge and experience threshold for effective governance.

2. Board Composition

a. Directors and Independence

BoDs' composition is often balanced between Inside Directors and Outsiders. Inside directors are individuals holding full-time positions within the company, while outsiders are primarily not from within the firm, though they can originate from past managerial teams (in this case, they are identified as "affiliated" or "gray" outside directors) (Cochran, Wood, & Jones, 1985). Independence is, therefore, not a systematic characteristic of Outside directors (Hermalin & Weisbach, 1991).

Given the lack of literature available about the internal mechanisms of boards, LeBlanc and Gillies (2005) attempted to explain board effectiveness by identifying factors related to directors. The authors studied director independence, competency and behavior's relevance as main drivers for effectiveness. Though director independence might draw risk deriving from the ensuing lack of industry expertise, regulatory and academic emphasis on the topic is supported by the intention of curbing agency problems. However, no causal relationship has been established

[2] Fraudulent accounting and audit activities of Enron, Wordcom and Tyco were exposed, agitating financial markets and ensuing the Sarbanes-Oxley, which enforced provisions on BoDs and Audit Committees.

between this characteristic and performance. Aside from the importance of having a demographically-diversified board in attempting to seek complementarity based on the resource dependence theory, the authors also stressed the difference between experience and competency, listing a skills matrix for assessing directors to safeguard transparency. Finally, a set of desirable behaviors that can be potentially strengthened has been set and positively tested to favoring effectiveness. Among others, qualities such as independent judgment, capacity to challenge and willingness to act are relevant for our topic.

Nonetheless, an informational gap might exist among outside directors as their knowledge of the company's operations is superficial, leading to a relationship between director effectiveness and the firm's informational flow environment (Adams & Ferreira, 2007). As opposed to outsiders, Mace (1971) argued that inside directors have a high added value to CEOs as they provide insight and advice about daily operations while conveying information to the board-level, closing the information gap previously mentioned. Always considering agency problems, Cohen et al. (2012) shed the light on the "Cheerleader effect", raising questions about the outside directors' real independence, as they demonstrated that CEOs prefer hiring outside directors that are familiar and overly sympathetic to management. Passiveness and disinterest can also mark an outside directors' tenure. This might suggest a tendency towards indifference marked by the disinterest of such "cheerleader" directors in active monitoring.

Post-2002 shifts in the proportion of insiders were explained by the idea that their interests are aligned with the management of the firm, adversely to external directors who are perceived as more inclined to act in coherence with the shareholders' interest by making long-term profitability oriented decisions (Hill & Snell, 1988). Although such conflicts of interests spanning from agency problems are assumed to perturb firm value, research did not provide significant evidence of the

relationship (Dalton, Daily, Johnson, & Ellstrand, 1999). Indeed, recent corporate scandals and subsequent reforms combined with increased public scrutiny emphasized on the importance of outside directors (Linck, Netter, & Yang, 2008), given that their interests are the most in line with shareholders' stakes (Brickley, Coles, & Terry, 1994). It has also been extensively discussed in studies that board independence is crucial in the context of crises. Hambrick & D'Aveni (1992) reported that there were less outside directors in bankrupt firms than within the healthy ones, reportedly due to their direct implication to efficient corporate restructuring (Johnson, Hoskisson, & Hitt, 1993).

b. Board Size

Theory-driven ideas have yielded mixed results regarding the influence of a boards' size on a firms' performance. Though rationales might emphasize on the advantages of having a large board (Goodstein, Gautam, & Boeker, 1994), or, oppositely, on social constructs emanating from small boards (group cohesiveness, for example) (Evans & Dion, 1991), a meta-analysis by Dalton, Daily, Johnson and Ellstrand (1999) established positive board size-performance correlation. There is, however, still no consensus over the relationship as empirical research is contradictory and each study focuses on a certain set of factors. While Resource dependence theories stresses the need for a large number of directors to pool competencies needed for a company evolving in a complex environment, focus and participation and genuine interaction in smaller boards are also believed to benefit the organization by adding cohesiveness. Assumptions in the literature addressing technology are mainly made based on the small boards' benefits.

Fich and Shivadasni (2006) provided statistical evidence to the mentioned above characteristics by surveying the 508 largest U.S. companies. It has been reported that, on average, a board includes 55% of outsiders, has 12 members and holds 7.5 meetings annually. It has also

been reported that outsiders hold on average 3 board positions simultaneously. Those results have been confirmed later on by a study by Linck et al. (2008) of 8000 smaller companies.

c. Committees

Boards can delegate relative authority to committees, which are panels of a smaller number of directors. Each committee has a specific function and holds meetings independently from the board. The audit, compensation and nomination committees are the most prevalent ones.

In that respect, Klein (1998) established the relation between firm performance and committee structure. His findings advanced that the composition of certain committees – mainly through the inclusion of insider directors – is positively related to the performance of the firm. Additional research by Westphal (1999) suggested that as the number of insiders increases, the subsequent surge in interactions and counseling with the top management leads to more governance involvement.

3. Two-tiers Board Systems

Corporate responsibility laws differ from one country to another. While most of the literature outlines the advantages of governance systems as a whole and pushes for the case of a Boards of Directors that represents different stakeholders, regulators in some countries advanced the possible complications from single boards' poor monitoring and concentration of power and proposed multi-tiered systems (Solomon, 2013). The most prominent one is the dual board system that is predominant in continental European countries. The latter was originated in Germany in the 19th century and consists of two independent different entities, a supervisory and a management board (Jungmann, 2006). These bodies interact in both directions as information flows among them via mechanisms. The supervisory board is often regarded as in charge of long-term decision

making and supervision of the management board through providing guidance, approval and ensuring control. The latter, composed of full-time managers, addresses tactical points within the daily/short-term context and reports to the first. This adds independence to the decision-making processes as it balances powers within the top of the hierarchy. In such systems, shareholders appoint the supervisory board who, subsequently, designate the executive management internally within the corporation (Mallin, 2013). The CEO and other executives cannot take part in the supervisory entity given their administrative role in managing the day-to-day activities of the company (Solomon, 2013).

The downside of such systems is that the distribution of powers it entices may result in political tensions, affecting the competitiveness of the company in the long term (Hilb, 2016). Indeed, dual boards have been criticized for their lack of reactivity when facing market forces, that is mainly due to the lack of interaction among executive and non-executive directors that this model entices (Cheng, 2014). A sound working relationship between the CEO and the Chairman is therefore essential for the healthy functioning of the board as a whole.

4. Tunisian Boards of Directors

The economic fabric of Tunisia it is marked by the prevalence of Small and Medium sized enterprises (SME) that represent 97% of the ecosystem (Répertoire National d'Entreprises, 2017). SMEs in Tunisia are defined by the Financial Market Council in a press release as companies with either fixed assets under approximatively 1,100,000 EUR or that engages less than 300 employees, regardless of their legal status (2006). This category of enterprise contributes by 40% to the national GDP and represents 70% of the employability. PLCs and LLCs account for respectively 1% and 15% of the private companies (Répertoire National d'Entreprises, 2017).

Concurrently, family businesses represent a big portion of the Tunisian economy with roughly 95% of the registered companies being SMEs with a large family ownership portion (BenJemaa, 2008). Moreover, the list of the 20 largest corporations shows that the vast majority are. owned by family groups. Also, taking into consideration the 400 biggest private companies it has been proven that 75% of them were family businesses accounting for more than 3 billion euros in revenues. As concerns about the transition and succession processes have been raised by literature (Gersick & Felieu, 2014), Khlif et al. (2016) reported that Tunisian family business with high levels of power and a strong culture are less likely to have outsiders sitting on their boards, while the board becomes more independent as ownership is transitioning through generations. Such organizations are said to associate outside board exclusively with operational complexity. The latter confirms the link between ownership structure and board composition that is described by the authors as non-linear with respect of the evolutionary needs of the firm.

Cigna & Meziou (2017) provided an in-depth analysis of corporate governance practices in Tunisia in order to assess its situation and compared it to 34 other transitioning economies. Corporate governance in Tunisia is regulated mainly by the Law No. 2000-93 enacting the Commercial Companies' Code (Republic of Tunisia, 2011) which is heavily influenced by the French governance models. Specific laws are enforceable on listed companies and financial institutions as well. S.A.s (public limited liability companies, PLC, with a minimum of 7 associates and 5,000 TND in capital) are free to adopt either a two-tiers or a single board system, although it is more common for bigger S.A.s and listed companies (which have to be under an S.A. regime and hold a minimum of 50,000 TND in capital) to have a single-tier directorship. Indeed, only one of the top 10 biggest corporations have a dualistic board structure. SARLs (Limited Liability companies, LLC, minimum of 2 associates and a capital of 1,000 TND), on the other hand, do not

have a board but associates (or investors) who appoint a general manager that is appraised on a yearly basis during a general assembly. Under the one-tier regime, the CEO and Chairman positions are usually combined. Boards (monistic or supervisory boards) have an average of 8 members.

Except for the banking sector, boards are encouraged - but not required - to appoint independent directors. Large and listed S.A.s are required to have an audit committee that, counterintuitively, might be composed of other executives than the CEO. Banks should have both risk and audit committees composed of non-executive directors and chaired by an independent one. The code of corporate governance for public companies also acclaims installing compensation, nomination and strategic committees. Legal entities might also be embodied on the board level by a representative, raising doubts about their competencies and lowering the degree of fiduciary duties[3].

Nonetheless, such structures and mechanisms are very blurry in the Tunisian eco-system. When surveying the ten largest listed companies, the authors found out that 9 of them had audit committees while only one provided its composition and none of them reported having other committees. It is also stated that there are no requirements on the disclosure of non-financial information and compliance with the corporate governance guide. Once again, only banks are compelled to report their annual financial statements. The looseness of the regulation coupled with the characteristics of the Tunisian economy are hindering sound governance practices. Family ownership, which is relatively ubiquitous in the economy, negatively affects the voluntary disclosure of information given that owners/managers benefit from a direct access to internal

[3] Fiduciary duties imply that the representative of the institution act in the beneficiary's interests instead of its own. (PRI, UNEP FI, & The Generation Foundation, 2018)

information, as demonstrated by Turki and Omri when studying 35 Tunisian listed companies (2008). All of the aforementioned embodies the weaknesses of such boards in their disclosures' transparency and the low legal protection of minority shareholders, which ultimately affects investment.

IV. Enterprise Business Technology Governance

1. Enterprise Business Technology Governance's Role

The ITGI (2003) defined EBTG's five focus areas, which include the IT Strategic alignment, value delivery, resource management, risk management and performance measurement. Nolan & McFarlan (2005) proposed two stances that a board should adopt when governing its IT structure via their IT Strategic Grid (Appendix B). The defensive posture includes the support and factory modes, where IT has negligible strategic importance and more focused on reliability needs. On the other hand, the offensive stance (embodied in Turnaround and Strategic modes) stresses the tactical importance of technology and consequent risk and high costs linked to the organizational changes it implies.

Given its rising importance, Valentine & Stewart (2013) suggested that IT Governance requires more attention from executives and directors to regulate the gap between the perceived importance of BT and the current generalized lack of expertise related to the topic. The authors urged boards to consider technologies as integral to their operations and to acknowledge its associated risk. This would develop dynamic capabilities in sensing trends, seizing opportunities and reconfiguring the available resources while transitioning to an agile corporate culture stemming from, the improvement of EBTG (Bankewitz, Aberg, & Teuchert, 2016). Indeed, as the technology became more relevant and integral to organizational models, the boards' role in oversight and resources allocated occasioned revolutions in practices and processes (Andriole, 2009). Those changes are, however, relative to the nature of the industry the company is operating in and the nature of the enterprise (tech vs non-tech).

To face this paradigm, Nolan and McFarlan (2005) pushed forward the case for the necessity of an IT Governance committee composed of independent directors and a CIO/CTO (Chief Information/Technology Officer) positions with a strong link to the audit one, as it also affects regulatory matters as seen with the Sarbanes-Oxley act compliance. Jewer & McKay (2012) proposed a theoretical framework for antecedents of effective board IT governance practices based on institutional and strategic choice theories. They also demonstrated that a high number of directors on the board decreases their level of involvement. Findings included strong evidence about the importance of IT competency on its governance; suggesting that decision-makers benefit from the structures, processes and relational mechanisms in accessing information to support their decisions. On the other hand of the framework, proven organizational factors included its size, age and the implied role of IT.

2. The State of the Practice

a. EBTG Awareness Gap

Albeit the urgency of such measures given recent evolvements, a Burson-Marsteller report dating back to 2005 stated that the Fortune 500 have not fully embodied the strategic importance of such roles given their lack of representation at the highest organizational positions (Burson-Marsteller, 2005). More recent surveys of the director skills have shown that Technology-related skills are still misrepresented: merely 15% of the directors reportedly possess such skills, while almost 50% of the boards have at least one director with tech expertise (Adams, Akyolb, & Verwijmeren, 2018). Another PwC statement disclosed that only 1% of the Fortune 500 boards report IT Expertise within their ranks (2012). Grossman, Rickards & Viskin (2014) reported that

only 116 directors of the Global 300 companies are considered as digital, with an increasing growth rate. All of this implies a lack of meaningful IT discussions with the senior management.

Pfeffer (1972) found evidence that as companies get bigger, more directors are needed on the board in order to face all contingencies imposed by the complex environment, which also favors a lower level of director involvement in such big and diversified companies embodied in the Fortune 500, based on Jewer and McKay's (2012) findings mentioned above.

b. Demographics' Role

Another joint board survey by WomenCorporateDirectors and Heidrick & Struggles ranked technology as the most under-represented skill set (Groysberg & Bell, 2013). Resulting from the urgent need to fill in tech-related positions given the wide reported gaps, boards might notice that digital directors appointed to the BoD can be younger and have a completely different corporate culture. As an example, a CEO of a tech company appointed to the board might need to make extra effort to influence decisions and initiate revolutions. Indeed, demographics play an important role here, as board members are on average 62 years old and have spent most of their professional lives in the pre-digital era, contributing to an unprecedented resistance to change (Leblanc & Gillies, 2003; King, 2012).

The Burson Marsteller (2005) report also stated that non-US organizations are more likely to address technological concepts at the board level: US companies are lagging behind their European and Asian counterparts. Their analysis concluded that India's top 25 companies ranked in the Economic Times are 10 times more likely than the top 25 Fortune 500 companies to appoint directors with prior executive experience related to technology. We can assume that there is gap in the research regarding the relationship between the regional setting and the board's IT expertise. Nonetheless, the reports' results are in line with the previously-mentioned IT adoption

determinants, mainly the organizational and environmental characteristics, which also entails that directors are more likely to discuss IT matters in an organization that has a favorable setting for IT implementation and use.

c. The Board/Executive Relationship

Aforementioned literature has shown that there is a large discrepancy among the top executives and boards' beliefs towards the matter. Huff et al. (2006) interviewed 17 directors and 17 CIOs and noticed that CIOs blame boards for their lack of IT attention, while directors consider themselves apprehensive of different risks rising from technologies. It also mentioned that CIOs do not support board level committees in their processes. When surveying more than 50 CIOs and CTOs, Andriole (2009) established that there is little board involvement in major technology-related decisions. It is discussed in the study that CIOs and CTOs have absolute control over IT decisions and therefore, do not need any intervention or help from the board. This is supported by the comments from the interviewees, suggesting that tech executives often consider directors as old people with no interest in technology and holding their positions because of their relationship and not due to their expertise. This leaves directors literally out of the loop regarding technological issues, consequently inducing missed opportunities in optimizing investments and widening the gap between technology and BoDs and with no incentive for executives to redress the issue. In assessing the digital inconsistency within companies, the author ultimately asserted that as we ascend among the organizational hierarchy, the awareness and sophistication of IT topics and challenges decreases.

V. Research Methodology

1. Research Question

The purpose of this study is to explore director's experiences when a company is facing disruptive innovation in order to assess the boards' digital maturity. As it has also been demonstrated that the social environment within the board highly influences the expectations and conditions of directors when addressing technology, we will try to enquire about a specific experience the director had previously encountered when dealing with such disruption and discuss its effect on the boards' technological discussions while insight about the pre and post-crisis states. Furthermore, the directors' perception of digitalization in itself can play a role in determining their degree of awareness and the priority level, as per the IT strategic grid model. Indeed, depending on the aspect from which the director apprehends the digitalization factor, we can deduct the stance that the BoD is taking when it comes to innovation given its industry and environment. We will also keep in mind the boards' technology governance practices, as we might infer digital expertise among participants in related discussions.

The research question that this paper answers is "are board of directors of Tunisian companies digitally mature when facing disruption and crises arising from technological innovation?". Their personal perspectives towards their company's environment and their idea about technology adoption and governance can shape their degree of readiness and the way they tackle business innovation at the board level.

2. Methodology

A qualitative analysis was conducted to examine various point of views and generate insight about the research question. As there is no "one-size fits all" in addressing technological implementation and perspectives in numerous companies, we would benefit from this method's flexibility and comparison features (McNamara, 2009). We will use a grounded theory approach to deduct ideas based on the answers provided with iterative approach. The interview guide (Appendices C and D) is built on the previously-made research to tackle a comprehensive set of characteristics and factors that answers our research question. We will also seize the opportunity to assess the whole board of directors' digital maturity when interviewing directors individually. Data will be collected through piloting semi-structured interviews with a homogenous sample of directors to generate insight. The sample is as representative of the Tunisian economy as possible, including several family companies and holding corporations. The interviews lasted between 40 minutes and 1 hour. Most of them have been conducted at the interviewee's office, although one of the interviews was done in an external setting.

Confidentiality measures were taken as information disclosed may be of delicate nature in regard to competitors. We have also noted the distrust and skepticism towards the recording of the interviews that has been demonstrated. Indeed, no interviewee has accepted to be recorded and transcribed. Such problems are said to be common in conservative, collectivist and family-centered societies. This has been highlighted by Hofstede (2001), who described highly collectivist societies as environments where accountability is high, and relationships are based on honor. This means that offences are associated with shame and humiliation. He also asserted that employer/employee relationships are seen as moral contracts just like family links. Being part of a family (on the nuclear or extended relationships level) therefore entices the members' full and absolute loyalty.

Wated & Sanchez (2012) also discussed the prevalence of nepotism in collectivist societies. This explains the high representation of family-owned companies in our sample. In our context, this alertness might be explained by the strong social influence inferred by the stewardship theory among the omnipresent family-centered businesses in the economy. Also, given the delicate nature of the topics that were discussed – which can be seen as a weakness – directors could have wanted to avoid discrediting the company to the public's eyes. Facing this issue, we have decided to take notes of the interviews and retype them digitally shortly afterwards.

The interview questions follow a certain strategy in order to gather information that answers our research questions. We will start by asking the director about the perceived importance and role of IT within the organization. We will then ask him/her to identify a crisis situation emanating from such digitalization (or lack of it) and lay out its consequences and reaction of the board. Given his answer, we will see if the latter resulted in a technological adoption or improvement. We will enquire if it was initiated by board members or rather by the executives. In each of the situations, we will also discuss the support and input that those propositions entertain from both entities. Subsequently, we will investigate their input in the decision-making process and possible complications in the technological discussion. Finally, questions about the perceived level of awareness and digital competencies gap, shifts in power and future discussion facilitation following that specific event were asked. The interview guide has been tested with an executive in order to smoothen out the process prior to the actual interviews. A background research on the interviewed director and the company was also conducted in order to improve the depth of the descriptors' analysis. The general approach that the interview guide follows can be represented in the following graph:

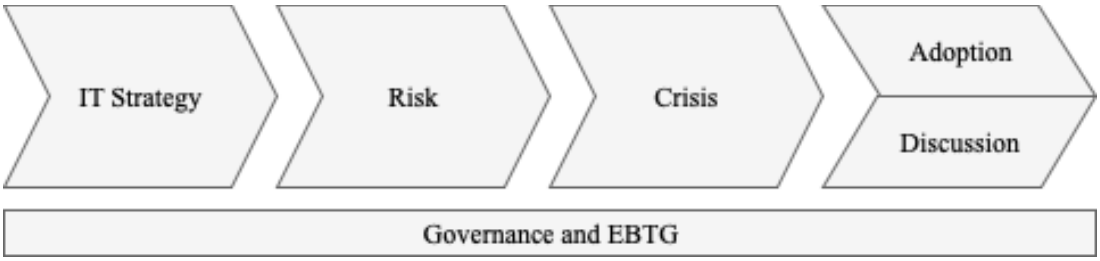

Figure 1 - Interview Guide Methodology

Following the data collection and organization steps, a mixed-method data analysis tool was used (Dedoose). Descriptors were linked to the directors and a code tree was mapped and applied to the interview answers to analyze content thematically. Some of the codes were weighted to assess the importance the directors perceive towards them. Based on this, the following map of the codes that emerged was traced:

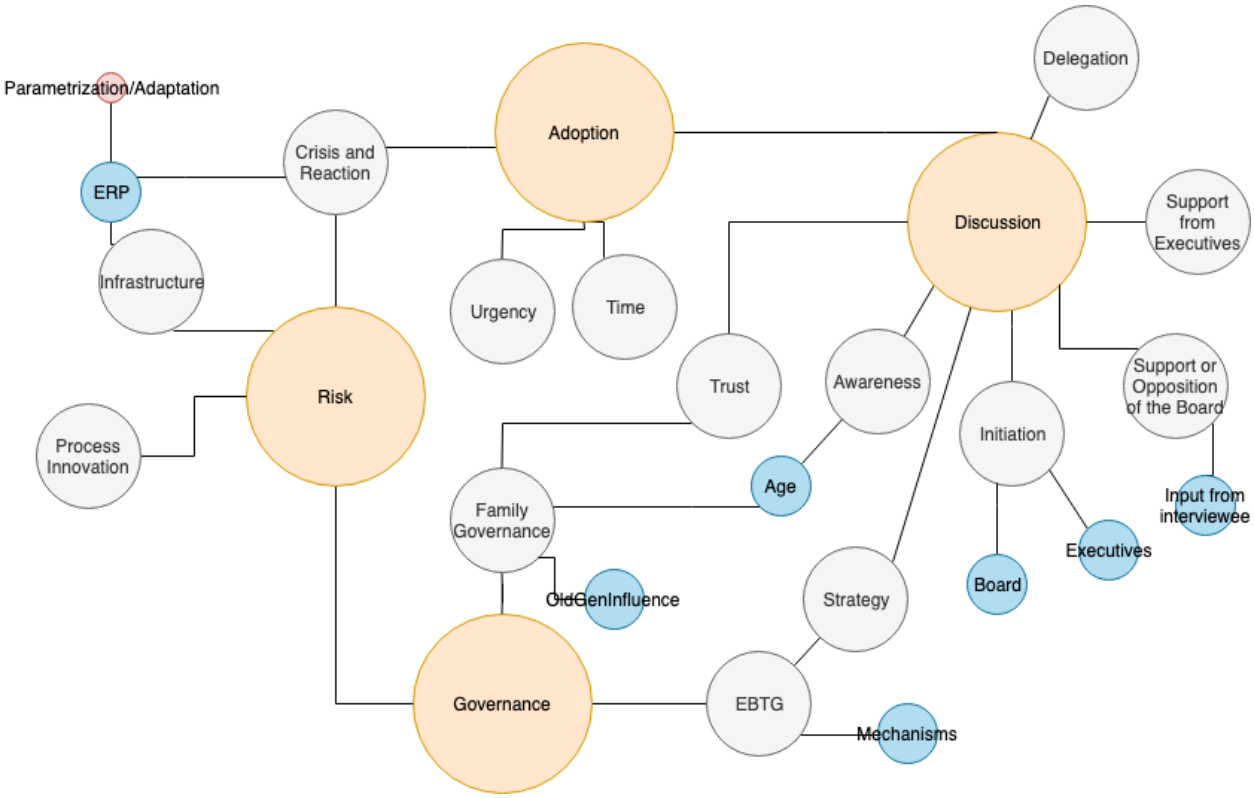

Figure 2 - Code Map

3. Sample

The sample of 10 directors was drawn in a comprehensive and homogenous manner. It was not constrained by any variable such as the size of the company, its sector or the background of the director. Holding companies have also been taken into consideration as they are very active in the Tunisian economy. The prevalence of family businesses led to their high representation in the sample**. Indeed, each of the interviewed directors' companies started off as family enterprise. External ownership developed at later stages for some of them as a result of capital needs for diversification purposes.** Directors have been contacted through the researcher's personal network within the Tunisian economic diaspora.

The sample is summarized in the following table:

ID	Board Members	CEO	Chairman	Board	External Ownership	Presence of CIO	Company/Group Size	Committees	Duality
1	11	No	No	Mono	Yes	Yes	Big	Audit, Compensation, Executive	No
2	7	No	No	Two-Tier	Yes	No	Big	Audit	No
3	4 & 5	Yes	Yes	Mono	No	No	Medium-Sized	No	Yes
4	6	Yes	No	Mono	Yes	No	Big	Audit	No
5	8	Yes	Yes	Mono	Yes	No	Medium-Sized	Audit	Yes
6	4	Yes	No	Mono	No	No	Small	No	No
7	3	No	No	Mono	No	No	Medium-Sized	Audit	No
8	4	No	No	Mono	No	No	Big	No	No
9	7	Yes	Yes	Mono	No	No	Big	No	Yes
10	4	No	No	Mono	No	No	Small	No	No

Figure 3 - Sample Summary

a. Director n°1

The company is a multinational holding conglomerate of 14 companies and component of the TUNINDEX20. Its one-tiered board is composed of 11 members, 3 of which are institutional

entities. The only permanent committees are the audit and compensation ones. The interviewee is serving as the secretary general of the group since 2018 and sits on the board for 15 years. He is also member of the permanent audit committee. I also had the opportunity to meet the group's IT and digital transformation director, who joined the discussion at a later stage.

b. Director nº2

The company is a private S.A. that operates as an EPC Contractor specialized in the energy sector. It is headquartered in Tunis with a presence in over 16 countries. The interviewee is the CFO and sits on the board since its founding in 1993. She serves on the management board but also represents herself in the general assemblies through the voting rights granted by the shares she holds.

c. Director nº3

The interviewee is the CEO and Chairman of an SME operating in the south of Tunisia. It is a primary exporting company evolving in the metal industry. The company has 15 middle managers and employs around 100 workers. He is also a shareholder and member of the board of another family-owned company that is active in the lumber industry.

d. Director nº4

The interviewee is the general manager of three subsidiaries part of a larger holding company, of which he is a board member. The managed companies are evolving in the chemicals, leather and international trade while the group started off in the food industry before diversifying in other sectors. He started his career as an auditor prior to holding the general manager position in a French-owned textile confection subsidiary until 2010.

e. Director nº5

The director is the CEO and Chairman of a Franco-Tunisian joint-venture that operates in the healthcare industry and serves the whole North-western African region. After starting as an independent local laboratory and rising as a challenger for foreign imports, the organization was partially acquired by a CAC40 multinational that is seeking to expand into fast growing markets. The board is therefore comprised of both companies' executives.

f. Director nº6

The interviewee is the director and chairman of a private secondary education institution. The high school administers education correspondingly to the Tunisian educational program. It is family-owned over two generations and the board includes 4 members from both generations. The institution has 10 permanent administrative officers and contracts more than 50 teachers. The interviewee is the majority shareholder.

g. Director nº7

The company is a pastry manufacturer. It is privately held by the successors of the founder. It is considered as the leader in the local market and is also expanding in Africa, Europe and North America through a franchising mechanism. It is now operating 23 stores and has 800 employees. The group also introduced foreign food chains to the Tunisian market. Governance is ensured by a board that includes the three successors, though 3rd generation family members actively participate in the strategic discussion.

h. Director nº8

The director is a regional manager and board member of an infrastructure and civil EPC contractor owned by his family. The company is one of the biggest construction companies in the

country, having been in charge of highways, planned cities and institutional buildings. It includes a team of 100 engineers and administrators and contracts, on average, 600 on-site workers. It also exports its expertise and had already planned and executed projects in the African continent. The board includes four members, of which two are the 2nd generation founders' children.

i. Director nº9

The director is the CEO and Chairman of two PL companies operating in the textile confection industry, a major pillar of the Tunisian exports. Both factories are entirely concentrated on the production of clothing garment fully destined to the European market through brand contracting. 80% of their client base is located in the UK. Both companies account for a total of 540 permanent employees, of which 27 are middle-managers. The companies are owned by the family of the CEO with similar structures, and therefore have the same board. The division is purely bureaucratic.

j. Director nº10

The director is an executive from the 3rd generation of a family owned commerce company that evolves in the timber industry. The interviewee is next in the ownership succession line and serves as a manager in the company. The board includes the three 2nd generation family members and the interviewee.

VI. Analysis

1. Technology Strategy

As the literature review showed, the importance that technology plays within the company highly influences its approach towards it and the subsequent top management and board attitudes. The data collected demonstrates that, in most of the cases, technological matters are exclusively concentrated on the infrastructure of the company. Indeed, only Director nº8 has disclosed that infrastructural IT is not considered as a pre-requisite for the industry they are operating in, although they do operate basic informational tools. Regarding the technology itself, we found out that most of the strategic decisions are directly related to ERPs or specific modules, though only two directors have also shown the perceived relevance of other innovations associated to business models and product or service enhancement. This proves that most Tunisian companies are lagging behind on the digitalization curve. Indeed, discussed innovations are solely related to the computerization of administrative processes, while only two companies are reportedly entering the Industry 4.0 era (term that has been mentioned by only one director) in those same functions with the adoption of cloud servers and analytics, for example. Business models and operations centered around the core product/service are still relying on previous technologies that contributed to the essence of the company since its foundation, as shown by Director nº7 in their reluctance to switch to modern production processes, for example.

Based on Nolan & McFarlan's (2005) strategic impact grid, we can assume that 7 of the remaining companies operate IT under the turnaround mode given its low impact on strategy but high levels of reliance on those systems, as it will be shown in the following sections. The remaining 3 are, on the other hand, using such technologies under the strategic regime as they

represent key components to their core business and are used as the pillar of their competitive positioning. Director nº1, for example, mentioned that the group considers IT as their highest priority. He asserted that business deals can be lost simply by not adopting new mechanisms required by their business partners, especially due to the fact that they operate in a highly competitive market on an international level. This adds up an interesting aspect to technological strategy definition: it appears that predominantly-exporting companies are more inclined to follow their clients' technological strategy than local-centered ones. This has also been affirmed by Director nº9, who mentioned that if the company does not comply with its foreign clients' informational requirements, both of his businesses are put at risk. Ultimately, director nº5 also referred to the foreign party of the joint-venture's important role in technology strategy setting. This leads us to believe that contact with foreign advanced-economies' companies is an important factor that facilitates technology decisions, whether peers are investors or associates on the value chain. Consequently, external factors such as partnerships, external pressure from outsiders and, to a lesser extent, competitive forces drive the boards' tech decision-making mechanisms.

Accordingly, we can deduct that director expectations are more oriented towards the optimization of administrative processes and improvement of competitiveness with regard to time constraints. IT's involvement in strategy formulation also seems to be minor and limited to the implementation decisions, as directors often referred to the on-going digitalization procedures as their sole technology strategy. It also appears that the size of the company also plays a role in this facet: as resources become more abundant ad diversified, IT functions become more centralized and essential to the quintessence of the company, as shown in figure 4.

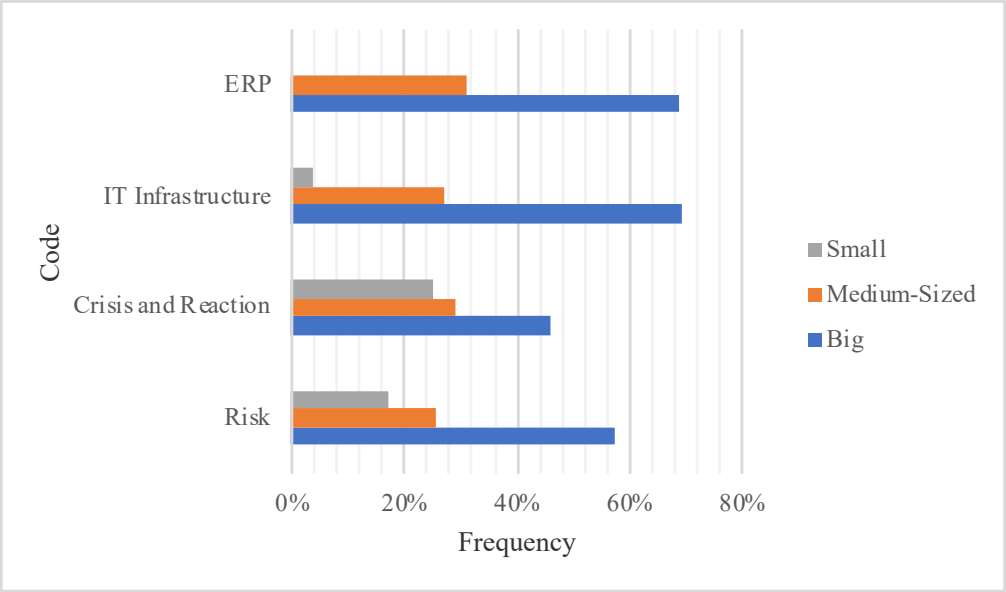

Figure 4 – Code Occurrence Frequency by Company Size

2. Technology Risk

The reported risk related to technology is ubiquitous among interviewed directors. It is even heightened, as reported risk sources are represented both on the internal and external levels. Despite the importance of technology in closing the gap with competitors, peripheral concerns, mainly related to cybersecurity, are expressed. This, however, appears to be more relatable to big companies as only directors 1 and 9 both have discussed the threat emanating from the misuse and fraudulent access to data.

Directors have also brought to our attention the looming risk related to the users' shortage of expertise and the administrators' lack of control over their systems. Directors nº4, 9 and 10 have discussed the risk coming from the lack of adequate expertise following the implementation phase, proving that meeting the requirements is considered as a follow up to the implementation. Director nº4 stressed on an error they have made in not training their employees to the use of a system only after its implementation, highlighting the linked opportunity costs the company incurred,

It has also been drawn to our attention that most of the internal risk is related to the parametrization of the technology in question, for both infrastructural and business model transformations, and its adaptation to the local environment. Regarding ERPs, for example, parametrization, adaptation and modelling of the informational tools are the major themes arising when discussing the risk factors. Directors nº1, 2, 3, 5 and 11 have pointed out the differences in the legal and systems between Tunisia and the country of the IS provider as a major barrier to its efficient use. Director nº1 and the CIO of the company also elucidated the abrupt shutdown caused by system failures. This, once again, proves that the Tunisian ecosystem have not reached a stable environment for digitalization tools to flourish, proving that conditions are not facilitating for such endeavors as backed by the UTAUT model.

In general, we noticed that executive directors, and especially those holding the chairman positions simultaneously, are more aware of the future problems that the company might encounter in the technological context, even though no one in the sample has held relevant IT positions. Director nº4 disclosed that as the company unfolds its digitalization strategy, he is -and consequently the board - becoming more aware of the issues they might encounter and is adopting a proactive approach towards it.

a. Crisis

In this context, we have found a link between the risky areas mentioned and crises arising from technology. Indeed, all the directors, except one, have disclosed witnessing a situation of crisis related to the technology and specifically to the internal risk he/she mentioned. While most of them are directly related to the infrastructural aspect, Director nº7 also experienced an emergency linked to the company's business model. Consequences of those events typically

implicate financial and material losses and opportunity costs. Some penalties have also been incurred due to contractual auditing obligations, as did both companies of Director nº9.

The consequent immediate response usually consists in reactive remedial solutions. Director nº5 ultimately asserted that such problems do not affect the digitalization strategy as a whole. “We try to anticipate, fix and move on” he claimed. Nonetheless, most of the directors are directly involved in the aftermath of the problems the company encountered. In 6/9 of the cases, board members personally led the charge and interacted with middle managers other players in their reaction. Non-executives might also play a role in managing those situations as demonstrated by Director nº1. He asserted that he got implicated with the CIO and initiated the plan of action in tackling the problem. Director nº3 also said that IT matters are delegated to the CEO (i.e. himself), while Directors nº2 and 9 admitted turning to IT experts and consultants to deputize such issues. These cases back the idea that there is not enough IT expertise within some of boards in order to tackle those crises.

3. Adoption

The code co-occurrence chart (Appendix E) shows that there is a relative correlation between IT crises and adoption/system upgrade. Indeed, only Director nº2 has mentioned that the growth of the company is the sole factor in their technological advancement. Oppositely, Directors nº1 and 3 are taking a proactive approach to technology, ranking it one of their highest priorities. Timing is also said to have a great impact on such decisions. As discussed in the theoretical part, leveraging the right technology at the right time and on the right process is reportedly an on-going concern for leadership. Directors nº3 and 5 mentioned the continuity in the digitalization process: “IT is living and evolves […] There is always a continuity facet to implementations” said

Interviewee nº5. Moreover, we noticed there is a general understanding of the urgency of such matters despite the minimal effort in taking the lead and pioneering innovations. While this sense of urgency was heightened by Director nº9, who referred to the current situation as a "wake up call", other governing members (i.e. directors nº3 and 4) might prefer to wait until the technology is well implemented elsewhere or updated by the provider to minimize costs, which once again heightens the time factor in the digitalization process.

4. IT Discussions

a. Awareness Gap

We have noticed a high variability in interviewees' individual awareness of technological advancements which have been enforced demonstrated through the "IT Awareness Gap" code statistics[4] (figure 5).

Code	Count	Min	Max	Mean	Median	Range	Sum	SD	Variance
IT Awareness Gap	29	0	20	9.8	10	20	285	6.9	47.3

Figure 5 - IT Awareness Gap Code Statistics

Indeed, when shifting the focus from the director to the board as a whole, the variance in this weighted code's grading and use has proven to be high and resulted in a small mean-median gap. This reflects two contrasting contexts. On one hand, we have noticed that the awareness gap is wider among the generations. Directors nº 4, 7, 8, 9 and 10 expressed concerns regarding the majority ownership-board representatives, which are said to be completely out of the loop on technological matters. It is important to note that these are boards of family-owned companies. Directors nº4 and 9 went further by stating the board members reduced and rudimental use of

[4] Note: Weighted Code values range between 0 and 20 with a standard value of 10. 0 represents a low IT awareness gap while 20 depicts a wider gap.

communication tools such as emails. In this context, the age factor emerged as an important determinant in this degree of awareness, portrayed by the high co-occurrence of both codes (see appendix E). As much as Director nº7 showed enthusiasm about the relative high degree awareness of older board members, Directors nº4, 8, 9 and 10 expressed worries about this correlation. On the other hand, other directors mentioned that all board members are in full harmony and on the same page when it comes to IT. However, such affirmations might be biased due to the data collection method: as board members and owners are often known to the public, interviewees might feel uncomfortable with the disclosure of their point of views about such weaknesses as discussed under the methodology section.

IT discussions are therefore said to be either one-way or in full coherence at the board level. According to the interviewees who did not report any alterations in this gap in the aftermath of the crisis that they encountered, this is not subject to change in the pre and post-crisis states even if the board is said to become more favorable towards adoption. We can therefore conclude that no efforts are being made to close the awareness gap among the board.

b. Initiation

The aforementioned gap is also highlighted when we discussed cases of IT-project initiation. Determining the main starting point of discussion provides insight about digital maturity as tech-savvy individuals are more inclined towards sharing and introducing technological vanguard ideas to the board. Furthermore, based on previous findings about the governing bodies adoption expectations and motives, we would presume that such decisions are first considered on the board level. However, the data we collected shows that this relationship is not consequential.

The input we gathered shows that some of the companies adopt a top-down approach. Those same organizations are associated to the high level of awareness of the board in our data. In

this context, directors nº 3, 4 and 6 suggested that they represent the sole decision makers within the organization as a whole. We should, however, take into consideration the fact that they also act as CEOs, testifying again the effect of director and CEO duality on IT awareness. This might also be explained by the high concentration of power such markets. In contrast, directors nº2, 8 and 9, which are assumed to be part of boards lacking IT awareness, have claimed not debating any technological innovation adoption decision among them. Director nº2 mentioned that the boards' role consists only in approving the IT Departments' plan, which is often done routinely, while director nº8 is said to get information about the latest trends from his field engineers. Concurrently, directors nº1, 5, 7 and 10 unveiled that demand for such projects derives from both entities, while the board "adds a layer of urgency to the matters", as expressed by director nº1.

Director nº5 also emphasized on a previously mentioned statement related to the effects of foreign contact and presence of outsiders on the technological evolvement of a company, revealing that external board members of the joint-venture often push towards the larger groups' technological settings. This has been shown within our data, as companies with a portion of external ownership are less likely to have an IT awareness gap among the board, as shown in figure 6[5]. However, the relationship can also be causal in both ways, Director nº9 revealed that following his company's digitalization plan, more investors were interested in taking part and investing in his organization.

[5] Support and opposition weights vary between 0 and 20 with the value 0 being absolute opposition and 20 representing full backing.

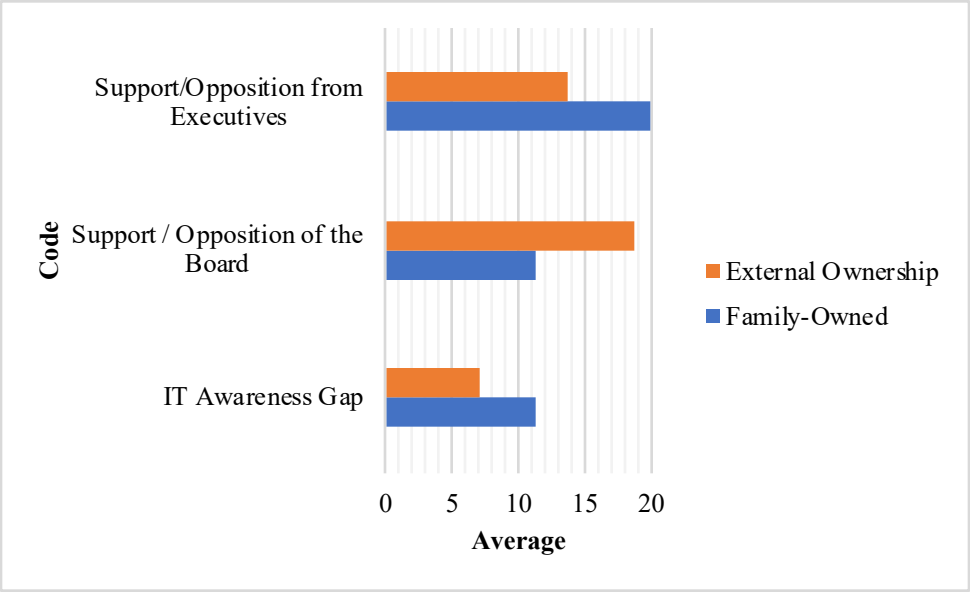

Figure 6 - Code Average by Ownership

c. Support

The next logical step following the initiation of discussion would be assessing the relevance of the matter by the Board and possibly the executives. Family businesses, like the companies of directors nº 7, 8 and 10, appear to spend more time addressing the generational gap between board members due to the need for IT discussion simplification prior to the assessment of the decision. Younger generation's board members are usually the link between executives and older members, explaining the concerned innovation more closely. While all interviewees expressed the enthusiasm of their boards towards new technological prospects, Director nº5 also noticed that executives were more likely to independently start initiating projects by themselves once they have the support of the governing body. This proves that the board's approach can trickle down through the organization and encourage IT-sympathetic behaviors. This is backed by our results, stating that executives – and mainly IT departments – are more supportive towards proposals as they are more exposed to its use and directly implicated in the ensuing optimizations, which might ascend to the top of the hierarchy and, consequently, to the board.

Directors also play an important role in facilitating tech decisions even if they are not directly involved in their initiation. Director nº1, for example, mentioned his role as a coordinator given his non-executive membership, using his professional network to speed up decision-making processes and mitigate risk. Director nº4 also mentioned the external influence from the directors' network in managing the crisis and taking stands when it comes to technological adoption. Moreover, directors sitting on several boards are also taking advantage of their experiences at each of the companies. This has been affirmed by Director nº3, who applied an implementation strategy used by one of the companies to the other, making the latter benefit from considerable time savings. We can therefore conclude that regardless of the idea initiation, digitally aware board members contribute significantly to the success of IT projects.

Nonetheless, cases of resistance to change are frequently emerging in our data. This is mainly related to a generalized fear from employees, although it seems to affect the board only insignificantly. Only one situation, witnessed by director nº7, mentioned a founder who wanted to stick to a more traditional approach, fearing that it would cost the company its unique brand image. Other directors have mentioned the lack of control over their functions as the main reason for employees and managers to thwart such changes. Director nº6 asserted that technological adoptions would put their jobs at risk either by making it irrelevant or due to their personal lack of expertise. Facing these issues, Director nº5 emphasized that a general manager with a strong sense of leadership and engagement is essential to mobilize the executives around him in order to achieve substantial results. Core rigidities are therefore mostly inherent in the human resources of the organization.

5. Governance

a. Family Business Governance

As most of the Tunisian business are based on a familial structure that owns and leads operations, we have found that this factor affects digitalization discussions when collecting data. Figure 6 shows that the IT awareness gap is bigger in family businesses. Figure 7 also proves that the age factor is more discussed in the same company type. As Directors nº6, 7 and 8 proved that older generations have a high influence on every decision made at the board level, which hinders technological matters as discussed previously. Director nº7 mentioned the reluctance of the founder about dropping old manufacturing techniques and traditional approach from fear of losing the brands' originality, while Director nº6 highlighted the importance of the human aspect for the founder which is deeply rooted in the enterprise values and makes it harder for the director to push for technological initiatives from a human resources perspective. From an administrative side, it appears that there is a high degree of informality around the roles of board of directors. Indeed, no family-owned business has committees on the board level. It is also reported in our sample that family businesses have smaller boards, raising doubts about the effectiveness of its governance in general. Moreover, there seems to be a certain form of trust from the rest of the board to the CEO/Chairman, who usually holds both positions in such enterprises. This leads to a concentration of power as directors nº3 and 9 mentioned that they represent the sole decision-makers of the company, only informing other board members about projects. This, however, requires a certain degree of trust from other owners and board members. We can therefore conclude that the board members other than the company's CEO of family businesses highly empathetic towards the CEO/Chairman do not effectively contribute to discussions, based on the cheerleader effect and board independence theories discussed beforehand.

We also noted that family-owned businesses are facing a new transitional phase. Following the founding of most the companies in the 50's and 60's and the successful first generational succession, there is concern about the future of the company. Director nº9 addressed this by stating that the continuity of the organization is at risk if he does not comply with the new industry standards. Digitalization is therefore partially included in the succession planning of such companies.

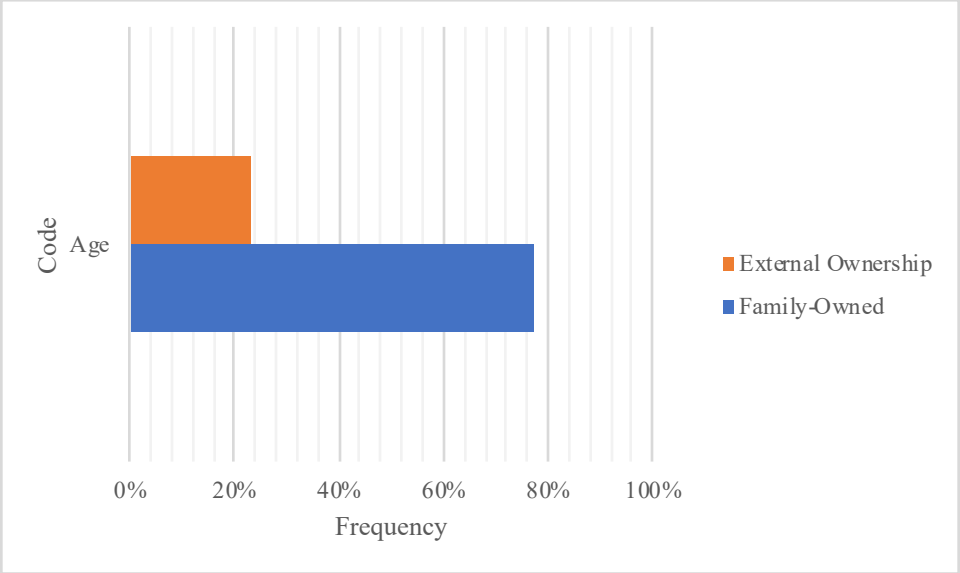

Figure 7 – Code Occurrence Frequency by Ownership

b. EBTG

EBTG practices are still underdeveloped in the Tunisian ecosystem. The data collected proves that only one company includes a CIO/CTO-similar role while none of them has an IT committee. Reporting mechanisms and tools are still described in two cases. Within director nº1s company, for example, the discussion with the CIO showed that he is directly involved with the executive committee (including all of the subsidiaries' general managers) which then ascends information related to technology to the board. This shows a certain level of independence for IT-related functions from the governing bodies. It also ensures the centralization of the group's

informational needs and minimizes risk, according to the director. At the same time, director nº2 and 5 shed the light on EBTG mechanisms from their sides, stating that IT projects have to be approved by the board first before assessing their progress on a monthly basis. While on the other hand, other smaller companies reported working hand in hand with their IT managers and departments, proving a high degree of informality around those discussions as mentioned by directors nº3, 4 and 7. This proves that as boards report no obvious IT expertise among them, the need for IT input gets bigger and more formalized as the company grows in size.

VII. Conclusion

The answer to our research question is clearly that Board of Directors of Tunisian companies **have not reached a level of digital maturity** while evolving in new technological paradigms. This conclusion is based on the directors' description of decision-making mechanisms and relations that reflect the state of digital awareness at the top of the organization. The investigation was conducted via semi-structured interviews over a sample of Tunisian board members from companies different in size, nature, industry and ownership structures. Questions were asked following a certain timeline by taking a technological crisis experience as the starting point for discussions and potential adoption.

First, the way boards address technology as an infrastructural asset and have not managed to exploit its full capacity infers about their relative priorities. As companies are far beyond the 4th industrial revolution and have not mastered their informational tools yet, boards seem unresolved to prospect the opportunities arising from disruptive innovation. Directors appear to get involved in IT discussion barely following specific events such as crises. Secondly, discussions among the board about technological matters are mostly unidirectional. Our results have shown that directors also acting as CEOs are the main decision-makers and are more likely to address technological issues and take action by joining forces with fellow executives. The fact that individual directors are involved in IT-decision making mostly on a reactive basis also proves that the board, as a whole, lacks responsiveness over these matters. Even though crises appear to smoothen out future technological adoptions, we noticed that the awareness gap is considerable among most of the board members and that no efforts are being made to close the chasm. This creates a certain need for IT expertise given that most of the IT-related matters are delegated to the operational level. Our results have shown that demand for new technologies arises from both the governing and

executive sides, but the decisions lies within the board, who assesses it from a financial angle. Boards, as a whole, are said to be generally supportive of new ideas, whereas there seems to be a lack of communication among members. In addition to that, we have proven that companies lack effective governance when it comes to enterprise business technology. Since the CIO and CTO roles and IT Committees are far from being installed in the near future, few companies demonstrated the enactment of reporting and assessing tools for informational aspects. Indeed, we believe that the governance, in general, is an important grey area in the Tunisian economy for most of the non-listed companies. Despite the fact that the usual duality of the CEO and Chairman roles appears to have a beneficial effect to the organization, reinforcing bodies and mechanisms would surely impact the firms' performance and specifically enhance the company's capacity in exploiting new technologies, regardless of the ownership structure. Nonetheless, some factors might affect that level of awareness from the board's perspective. It is clear, for instance, that while the age of the directors and the influence of older generations in family businesses affect negatively the digital awareness of boards, external ownership and CEO duality seems to enhance IT-centered discussions.

As Tunisian companies are enacting the digital transformation and evolving towards modern models based on informational flows, their governing bodies are not mature enough to embark on the fourth industrial revolution and harness its competitive potential through leveraging disruptive innovations. That is also due to various external reasons. Aside from the fact that the Tunisian environment has not matured enough to support its economical players' growth and unlock the potential of new technologies, the general laxness around governance practices does not promote the profitability and, most importantly, the sustainability of the companies from a forward-looking perspective.

VIII. Limitations and Further Research

The definition of digital maturity represent a major theoretical limitation to our research. As there is no clear consensus about this development stage, we ha d to base the research methodology on several aspects that might reflect that level. As the methodology we used in gauging the reaction towards crises and technological adoption decisions might produce insight about the directors' perception, it remains very subjective when assessing the board as a whole. In addition to that, there is an important lack of descriptive literature addressing EBTG in developing markets to base our comparison on. In addition to that, the dashing pace at which the topic is evolving would require consistent updates of best-practices and relevant case-study approaches.

Regarding the methodology, factors such as the externality of the directors, the independence of the board and its model (one or two-tiered) could be taken into consideration to evaluate their effects on the boards' digital maturity. We omitted those parameters in our analysis given the lack of representativeness of the sample of such descriptions. We could also discuss further the type of the company, given that holding groups prevail over the Tunisian economy. Indeed, the structure of the organization and the industry it is operating in are aspects that could be addressed when discussing technological awareness.

From a data-collection perspective, an obvious limit to the research is the non-recording of the interviews which is caused by a high level of vigilance from directors. As explained beforehand, in a conservative society where companies are mainly owned by families, the topic of digitalization might be critical as the low levels of awareness are often seen as a weakness.

Furthermore, the fact that the interviews have been conducted in Tunisian Arabic[6] and French prior to being translated to English might also affect the accuracy of the answers. Nonetheless, the author was aware of those issues and strived to deliver the most accurate recollection of quotes and translations. Another issue related to the data collection method would be the psycho-social effects around the discussions ensuing from interviewing highly-positioned experts.

Finally, to counter the subjectivity in interviewing the directors to assess their digital maturity, we could extend the research by inquiring the executive side of an organization. CIO/CTOs, IT Departments and concerned managers could provide insightful answers to the research question by probing their relationship with the board and defining antecedents. One area of further research would also be governance in Tunisian family businesses. As proven during the analysis, governance mechanisms are reportedly blurry and represent solely administrative formalities for enterprises. A descriptive study of the degree of compliance to regulations and comparison to other emerging economies would be relevant in assessing the degree of emergency of such practices.

[6] Tunisian Arabic is the spoken dialect in Tunisia. As Classical Arabic is used solely for administrative purposes, Tunisian Arabic is influenced by Arabic, French, Berber, Italian and Turkish.

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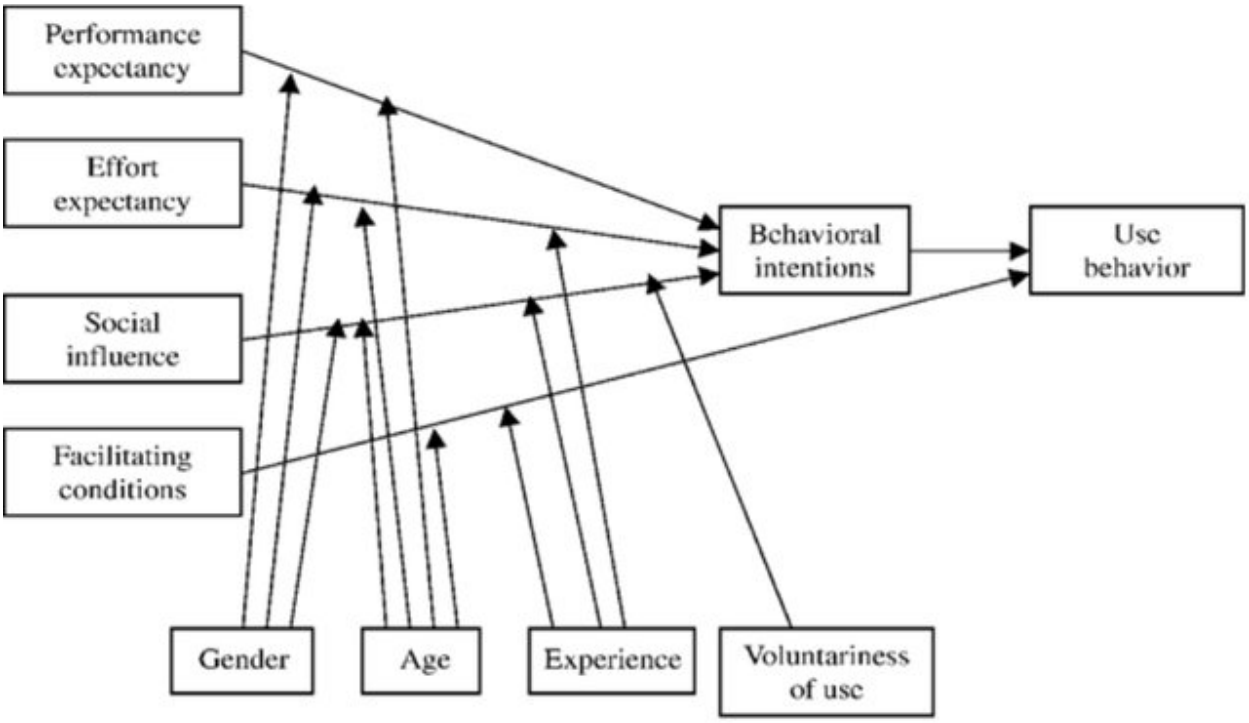
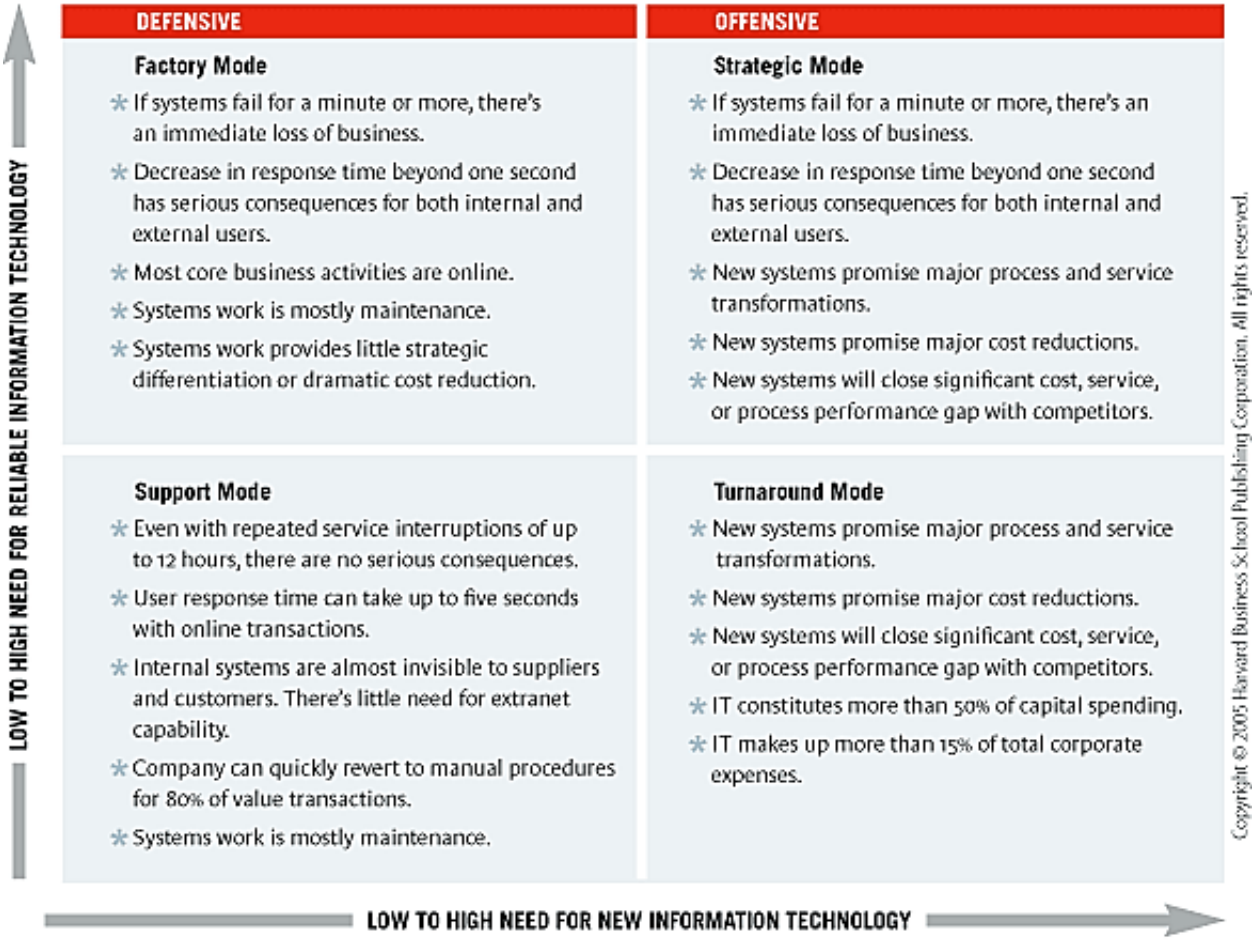
XI. Appendices

1. Appendix A: UTAUT Model



Unified Theory of Acceptance and Use of Technology - Venkatesh et al. (2003)

2. Appendix B: The IT Strategic Impact Grid



The IT Strategic Impact Grid - Nolan, R., & McFarlan, F. W. (2005). Information technology and the board of directors. Harvard business review, 83(10), 96.

3. Appendix C: Interview Guide

The research questions this paper answers is “are board of directors of Tunisian companies digitally mature when facing disruption and crises arising from digital innovation?”

The purpose of the research is to assess the digital maturity of the Board of Directors within the Tunisian ecosystem (BoD and Supervisory Boards). Questions will be focused on the directors’ perspective about a specific experience of a technological crisis or disruptive technology adoption to gather their input about possible complications related to technology adoption (on the infrastructural and operational levels) and their associated behavior.

Answers expected will only be focused on the boards’ apprehension of digitalization and its conduct. The interview will under no circumstances take into consideration the technology and the strategy related to the crisis or adoption.

a. Director background research before the interview

Academic Curriculum	Work Experience (Spec. IT Positions)
Company Boards (s)he is part of - Size	Number of years on each board
Number of Directors on every board	Insiders vs. Outsiders
Committees	CIO/CTO

b. Introduction

- Thank you for agreeing to participate
- Presentation of both parties.
- Confidentiality measures, permission of recording and transcribing the interview.

- Reminder of interview guidelines, right to not answer and reservations
- Use of collected information.
- General presentation and discussion of the thesis.

c. Technology Crisis

1. How do you evaluate the risk associated to the non-adoption of technological innovation? (e.g. advanced modules in ERP, new processes) (Keywords: Infrastructural – operational)
2. Do you recall any crisis arising from a lack of sophistication related to technology? (e.g. a badly implemented innovation)
3. What was the outcome? How did you face it?
4. How did the board adapt to that shock? Was it more favorable to tech adoption?

d. Digital Adoption

Initiated by the Board

5. Do you recall any specific technology adoption situation initiated by the board? What were the reasons behind its adoption? (Keywords: Defensive vs offensive)
6. Who initiated the idea? How was input from each the management and the directors?

Initiated by the Executives

7. Was the board supportive of that initiative?
8. What was your impact on the decision? Who else contributed to the decision? How was it assessed?

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9. Were there any issues, resistance or complications from any party? Who? Why? How was that managed?

10. Did you notice any changes in digital competencies and awareness in general when discussing the issue with other directors?
11. Did any shifts in power occur within the board in the aftermath of this experience? (i.e. someone's influence increased)
12. Did you notice any change in that digital awareness gap afterwards?
13. Did that episode smoothen future technology discussions? How did the board adapt to that episode?

e. Closing

- Thank you
- Is there anything else you would like to share, feedback, insight? (Off record)

4. Appendix D: Interview Guide, French Version

La question de recherche à laquelle le mémoire répond est la suivante : « Quel est le degré de maturité digitale atteinte par les conseils d'administration des sociétés Tunisiennes face aux défis que représentent les disruptions et les crises causées par l'innovation technologique ».

L'objectif de la recherche est d'évaluer le niveau de maturité digitale des conseils d'administration de l'écosystème Tunisien (Conseils d'Administration ou Conseils de Surveillance). Les questions porteront sur le point de vue des administrateurs en se référant à leurs expériences personnelles : face à une crise technologique ou à l'adoption d'une innovation disruptive - afin de recueillir leurs aperçus sur les éventuelles difficultés d'intégration de la digitalisation (infrastructurelle ou opérationnelle) au sein de l'entreprise et de leurs comportements.

Les réponses escomptées reposent uniquement sur l'appréhension du conseil d'administration (ou de surveillance) de la digitalisation ainsi que sur le comportement des directeurs. L'interview ne tiendra pas compte de la technologie ou de la stratégie employée.

a. Recherche avant l'entrevue

Cursus Académique	Expérience Professionnelle
Nb de conseils d'administrations	Nombres d'années en tant qu'administrateur
Nb de directeurs	Insiders vs Outsiders
Comités	CIO/CTO

b. Introduction

- Remerciements pour l'accord de rencontre.
- Présentation des deux partis
- Mesures de confidentialité, permission de l'enregistrement de l'interview
- Rappel des règles générales de l'interview, droit d'abstention
- Utilisation des données collectées
- Présentation et discussion du sujet de mémoire

c. Crise Technologique

1. Comment est-ce que vous évaluez le risque de la non-adoption des innovations technologiques ? (I.e. ERP, modules avancés) (Keywords : Infrastructure – Stratégie / facteur de croissance, efficacité, gouvernance)
2. Avez-vous subi un incident dû à un manque de perfectionnement lié à la technologie ? (I.e. mal paramétrisation de l'ERP).
3. Quel était le résultat de cette expérience ? Comment avez-vous réagi à cette problématique ?
4. Comment le conseil s'est-il adapté à ce type de problèmes par la suite ? Était-il plus favorable aux adoptions ?

d. Adoption Digitale

Initiée par le Conseil d'Administration

5. Est-ce que le conseil a déjà initié l'adoption de nouvelles technologies ? Quels étaient les motifs/attentes de cette adoption ? (Keywords : Infrastructure – Stratégie / facteur de croissance, efficacité, gouvernance)

6. Qui a initié l'idée ? Quelles étaient les contributions des autres directeurs ? (Keywords : flow et contact avec l'exécutif)

Initiée par l'Exécutif – Direction Générale

7. Est-ce que le conseil d'administration était favorable envers cette initiative ?
8. Quel était votre impact sur la décision ? Quelles étaient les contributions des membres ? Comment a-t-elle été évaluée ?

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9. Y a-t-il eu des problèmes, de la résistance ou des complications de la part d'une partie ? Qui ? Pourquoi ? Comment avez-vous géré cela ?
10. Avez-vous remarqué des changements au sujet des compétences et de la sensibilisation au numérique en général lorsque vous avez discuté du problème avec le conseil ?
11. Des changements au sein du conseil ont-ils eu lieu à la suite de cette expérience ? (I.e. : l'influence d'un membre a augmenté ou diminué, résistance au changement)
12. Avez-vous remarqué un changement dans l'écart de la sensibilité digitale entre les membres par la suite ?
13. Cette expérience a-t-elle facilité les futures discussions sur les technologies ? Est-ce que vous pensez que le conseil s'est adapté ? (I.e. plus favorable envers les adoptions)

e. Clôture

- Remerciements
- Avez-vous autre chose que vous voudriez partager : remarques, commentaires, idées ? (Off-record)

5. Appendix E: Co-Occurrence Chart