Technology in the Board Room – The Changing Face of Corporate Governance

Report Submitted to

National Foundation For Corporate Governance

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CHAPTER 1

Introduction

India's current digital trade export has approximately touched US$35 billion and further it is expected to cross US$700 billion by 2030. The contribution of information technology sector in Indian GDP is expected to reach US $ 1 trillion by the year 2025. The growth in export and trade of IT services are attributable to India's favorable trade policies and access to related data facilities provided by the foreign trading partners. Further, the potential of new technologies to 'disrupt' the management of organizations, practices and people dynamics, including the senior levels have been acknowledged in the recent past. One striking example of this disruptive effect is the challenging role played by use of technology, including Artificial Intelligence for directors and decision-makers. The sudden rise in the use of big data from technological interfaces as a new knowledge source has prompted corporate decision-makers to make decisions more rapidly and shape their capabilities to proactively address environmental changes. Despite considerable research on making strategic decisions, the focus has been limited to how Big Data as a part of organizational technology has influenced the way decisions are made and impacts the strategic decision making, including how these data are handled at board levels. Hickson et al. (2003) has identified the 'knowledge base' used by UK senior managers to inform their strategic decision making as one of the most important factors in the decision's success. However, while this was a large study with 55 UK cases, wherein the information for decisions was largely well-known that has been referred to as the extant knowledge, the availability of reports as the explicit knowledge

or the tacit or implicit knowledge which are memory retrieving information from experiences of the organizational people of priority residing in the people resources of the organization.

In viewing strategic decision-making as a process of making choices under varying conditions of uncertainty, the decision-making literature cites lack of information as a key source of uncertainty (Nutt & Wilson, 2010). In the era of technology integrated decision making, any lack of information is transformed into an abundance, which has the potential to reshape data into usable information. As such, these data offer the potential to reduce decision-making risk and improve strategic decision making by allowing senior leadership teams to take a more holistic view (Filatotchev & Nakajima, 2010). The advent of information through technology, AI and Big data has also spurred changes to board processes and structures with potential consequences for how strategic decisions are made. There is evidence that boards are moving away from top-down planning and instead processing large amounts of digital data by adopting techniques like competency modelling and real-options analysis. The complexity of the decisions being made and of the data being used induces feelings of certainty especially in the face of high-risk decisions. Common predictions for technology's impact on corporations vary from forecasts of completely autonomous organizations, run entirely by algorithms, to more limited improvements and efficiencies in the workings of corporate bodies and procedures. The current distribution of powers is well known and similar across jurisdictions. Shareholders vote on control-related and structural decisions, such as appointing and removing the company's directors and approving mergers and liquidations. Directors, in turn, are responsible for making business decisions, such as whether to launch a new product or dismiss a supplier, but typically delegate day-to-day management to company executives and officers and retain policy-making and monitoring functions. Unlike past

technological innovations, twenty-first century technologies have the potential to alter this balance. Particularly if used in conjunction with one another, they may decisively affect the determinants along which corporate law traditionally assigns power to various corporate constituencies. Technology intensive firms depend on high tech tools like artificial intelligence for data processing that act as a support to human decision makers to reach a result, especially when more complex corporate decisions need to be taken. In corporate level decisions, directors delegate complex analysis jobs to machines (artificial intelligence) but within the limit of legal boundaries, as legislation does not permit machines to act as directors in any company. Artificial intelligence has superior information processing capabilities, but corporate laws accept only decisions taken by human directors according to situations. Of course, machines can work as assistants to human beings but still due to corporate legal norms, they cannot replace natural persons. Responsibility for corporate decision making and related failures falls on the shoulders of executives and board members, who concede that they're struggling. A 2015 McKinsey study found that only 16%. of board directors said they fully understood how the dynamics of their industries were changing and how technological advancement would alter the trajectories of their company and industry. The truth is that businesses have become very complex and are moving too rapidly for boards and CEOs to make good decisions without intelligent systems. It is believed that the solution complex decision making will be to incorporate AI in the practice of corporate governance and strategy. It highlights the fact that it is not about automating leadership and governance, but rather augmenting corporate board intelligence using AI.

In the last one decade, digital revolution has changed the many aspects of corporate decision-making processes and operations of the business. Corporate governance needs to adopt these

technological changes to remain relevant. Regulatory models also need to adopt this technological development to be effective and remain relevant. Today, corporate houses need more dynamic, experimental, and polycentric regulatory forms that are responsive to changes. In the changing environment, business houses are adopting new technology, but no such changes are taking place in legislation. Change in technology demands modification in legislation to implement new technology in decision making process. So, there is a gap, and this gap needs to be identified to bring changes in legal laws to reach. According to Libert, Beck & Bonchek (2017) companies have their own components — people, assets, history — which could be called the corporate genome acting as a precursor to corporate governance systems. To effectively build an AI system to improve corporate decision-making, organizations will need to develop a usable genome model by taking three steps:

a) Create a body of data by mapping the corporate genome of many companies and combine this data with their economic outcomes.
b) Develop a method for quantifying an individual company in order to assess its competitiveness and trajectory through comparison with the larger database.
c) Use AI to recommend a course of action to improve the organization's performance — such as changes to capital allocation.

The primary determinants of the current balance of powers in corporate organizations that concern which decisions must be made and how they should be settled. These determinants are (i) the speed and frequency of the decisions; (ii) the information necessary to decide (and who has access to it); (iii) the costs of assigning decision-making responsibilities to a collegial body; (iv) the decision-makers' incentives and interests; and (v) their competence and skills. Looking at whether and how

these five dimensions are altered by technological innovation is the essential, and yet unexamined, analytical tool to predict the impact of technology reliably and accurately on corporate governance. More fundamentally, new technologies may strengthen existing corporate roles, providing those who already make decisions with new tools to operate more efficiently or, conversely, shift the balance on who is, in certain respects, the best decision-maker within the corporation. The result may not seem revolutionary at first glance, but it foreshadows potentially disruptive consequences for existing corporate governance models and demands renewed attention to ad hoc contractual solutions aimed at redesigning the roles of shareholders, directors, and managers on a case-by-case basis. Among the other things, this AI based decision process increases the governance costs and protection of data is also a major issue. In data processing, data sharing is not limited only within the organisations, so considering the importance of data, its security and protection is a vital issue. This is possible through an efficient data management framework which will ensure data protection. Legislation may also perform a role through various legal provisions but very strong legal provisions may restrict data sharing and its access which is not in favour of the organisation's growth.

Current Directions in Corporate Governance and Technology

1.1 Data Localisation Laws & Regulatory frameworks

It is stated that data protection laws on e-commerce business in India have acquired priority. Based on the responses received from the e-commerce service providers, studies have identified that data

localization regulations impact business. The localisation of data increases the operation and access cost for the multinational companies but its impact on products' demand and business is not significant enough. However, literature has reported strong concerns over the security and protection of data for which the legislations make it compulsory to store the personal data of consumers in the local server in India. While India is benefitting from the flow of personal information of citizens of its trading partner countries, it has its own data protection laws which restrict free flow of financial and non-financial data across the border. Some Indian legislations which restrict data flow are Information Technology Act 2011, RBI regulation on local storage of payments system data, Personal Data Protection Bill 2019 (which is yet to be passed by the Parliament of India). A study was conducted on 27 foreign countries and its trade with India, that revealed that any restriction on free flow of data has negative effects on volume of trade on India. Further, the data analysis indicates a shortfall of digital trade worth US$19 billion in a span of five-years starting since 2017. There is also a loss of US$ 18 billion investments in India in the past three years, since 2017. The negative effects on trade volume were the result of retaliation from the foreign trading partners against India's recent strict policy of data-sharing with trading partners. Some of the examples of this restricted data are health care data, product demand or services, purchasing behaviour and financial transactions related data etc. The article concludes that though India has many bilateral and multilateral trade agreements with its trading partners and its own data localisation regulations but there is a need to redress this data sharing issue by mutual trade agreements which will allow data transfer across these trading nations with the conditions of safety and protection of data. For global economic growth, free flow of data is the primary requirement but in the past one decade, data protection measures have been taken by many

countries across the world which restricted the cross border free flow of data. These data protection legislation resulted in trade losses and influenced the supply of product or services. A recent study in Nigeria, in the past five years has taken a very strong measure by issue of 'Citizenship safety procedures' to restrict the flow of personal, financial and healthcare related data outside of the country. According to the guidelines of 'National Information Technology Development Agency (NITDA) Nigeria, all government and consumer related data cannot be transferred to other countries. According to WTO (2020), Nigeria lost 1.7% of its trade with China, European Union and Arab nations due to implementation of multiple data protection regulations. Further, instead of many trade agreements with USA, Canada, Mexico and Asian countries, restriction on data flows results in billions of trade losses every year to India. In the Asia-Pacific region, government and regulatory bodies of many emerging countries have raised their concerns on protecting data related to consumer personal and financial transactions which are collected and transmitted by various firms. The cross-border data transmission enables intensive competition among producers. Data localization laws create a barrier and limit the consumer choice due to its effect on price and quality of services. Liberal economists are also in favor of free flow of data between consumers to producers as any restriction on data transfer may adversely impact the quality of service and other economic consequences. Digital firms collect various types of personal data related to consumers like purchase history, choices of consumers, web sites visits or even location of cursor through use of artificial intelligence for their analysis. All these data help producers to improve the quality of goods or services, reduction in price and increase in demand. But data localization laws restrict the free data flow to producers, especially when producers are from another location. The general data protection regulation (GDPR) of European Union established that any data processor or

controller may transfer personal and e-commerce data to third parties on given clauses for safety of the transferred data. The European Union countries support free flow of business data but on data protection terms. The influence of GDPR (General Data Protection Regulations, 2018) with continuous enactment of new regulations in recent years shows the global impact of this regulation, especially in the Asia-Pacific region. Localization or local hosting of data enhances the privacy and security by ensuring adequate level of protection by legislation. This localization of data has two sides, first social aspects which support such data protection mechanism by the government in order to maintain privacy and unnecessary cross border transfer of sensitive data and second, economic aspect which effects the business.

Data localization laws are becoming more common around the world. China instituted a strong data localization law to prohibit cross-border transfer of its citizens' personal, financial, health care and credit related data by passing Cyber security law in 2016. China's growing attention to protect electronically generated data is one of the outcomes of China's Communist Party's increasing focus on cybersecurity. In recent times, China has also introduced other regulations to restrict the free flow of data like "Provision on administration of online publishing services", "Interim regulation for the management of network of taxi services operations", "Administrative regulations on internet mapping services" and so on. The data localization requirements are also found in many APEC countries. Indonesia's Electronics System and Transactions Regulation 2012 states that all public service providers must locate their data center only in Indonesia for the purpose of law enforcement, safety and protection of data. Vietnam's government introduces data administration and protection law 2013 to enforce all entities to maintain at least one server center in Vietnam and prohibits the unauthorized use of financial and

non-financial data of its citizens. Canada amended its 'Freedom of Information and Protection of Privacy Act 2004' in 2016 to enforce public bodies to ensure their storage of and all access to its citizen's personal information is restricted to locations within Canada. The 'Health Record System' in Australia prohibits any cross-border transfer of data related to its citizen's health and ensure the local storage and access of such data within the country. Thus, strict data localization affects domains like e-commerce, social network and business revenues and also the quality of offers to the public. According to WTO, data localization and its effects on international trade has become a global issue and it is not surprising that some nations are negotiating towards trade agreements at regional level. BRICS nations - Russia and China both have their own data localization laws. In 2014, the Russian government passed the data protection and localization law which requires that all e-commerce, social network and personal data of Russian citizens be stored in local servers in Russia; any transfer or access of these data from abroad requires prior approval from data protection authorities. In 2006, Russia imposed 'On Personal Data law (OPD law)' that restricted cross-border transfer of any personal or business data. This law requires access and use of data only within the Russian territory. This OPD law negatively impacted the Russian economy to the tune of GDP loss of 0.27% each year which was equivalent to US$ 5.7 billion. As per the forecast of IMF in 2015, international investment in Russia was expected to fall by 1.41% due to OPD, which would also affect the employment rate. Hence, strict data protection law and regulations have been known to have a negative impact on economy, consumers and business. In 2016, China has implemented data protection and localization laws by passing the National Cyber Security Bill which required all business and social sectors in China to store all personal and financial data of citizens locally. India, unlike China and Russia, does not have a strong data

localization law. India is still debating its first Personal Data Protection Bill 2019 which is with the lower house of Parliament's joint committee for recommendations and modification in the bill. Under the Personal Data Protection Bill 2019, data protection and localization requirements mandate certain personal, financial, and business data to be stored and processed only within India. It also restricts the free flow of data and puts certain conditions on its access from outside India. This data localization requirement has potential to limit the utility in achieving the goal which also increases the economic cost. A multidimensional policy is needed to mitigate the cost of data storage and identify the gaps which are not redressed by the current legal framework. In India, data transfer and its safety, especially the data related to its citizen and businesses are governed by Indian Companies Act 2013, IT Act 2000 and provisions of various regulators like Reserve Bank of India from time to time. As per Information Technology Act 2000, the consent of citizens is necessary before permitting any cross border transfer of such data to perform any lawful contracts with India. The Indian Public Records Act 1993 also prohibits the government bodies from transferring sensitive data of different sectors without prior consent from the central government.

1.2 AI and Organizational Governance

Artificial Intelligence drives improvements in governance mechanisms in business and organizational changes. Research shows that the use of AI can benefit corporates in many ways. Technology has transformed the nature of business by making it less dependent on traditional source of authority. Specific areas where AI based technology improves efficiency of management include job automation, agency conflict, auditing processes, the selection of Board of Directors (BoD), compliance functions, data analytics, capital allocation etc. AI improves corporate

governance and lowers agency cost by automating decision making using real time big data analysis. AI based system provides information to shareholders and Board of Directors through improved audit which is important for corporate governance practice and selection of Board of Directors. Process automation using robotics technology may improve the quality of data available for shareholders, and hence empower them to make better decisions and decrease the disproportionate power of management. Machine learning techniques may automate or at least improve a significant part of the decision-making process, including the selection of Board of Directors, as well as helping to detect corporate misconduct. AI creates an opportunity to transition from sporadic monitoring from the Board of Directors and shareholders to continuous monitoring of management. At the same time, management would also benefit from AI through better information processing, and it would be able to act in the best interest of the shareholders. The role of large corporate structures in the world economy and politics is considered, the scale of activities of transnational corporations is shown. The characteristic of risks and problems of corporate governance at the present stage of the economy is given, the necessity of revision of scientific approaches to corporate governance considering the current changes in the activities of major corporations. The above-mentioned trends in the development of the corporate form of business organization entail the accumulation of new risks of corporate governance associated with the loss of manageability. This is since corporate governance systems are becoming global and out of control of the traditional Board of Directors. The rapid destruction of seemingly stable corporations is a manifestation of such risks due to usurpation of power by individual top managers, imaginary transparency, fictitious audit, etc. This requires a rethinking of approaches to the transformation of corporate governance systems within the challenges of modern reality.

Work on corporate governance and ethical practices in emerging technologies has stated that corporate governance in emerging technology-intensive firms over-conform with respect to both corporate governance and ethical practices; but in spite of such over-conformity, they have lower legitimacy levels compared to their non-emerging technology counterparts.

Artificial intelligence and other advanced technologies have recently entered into corporate board rooms, and have revolutionized the corporate governance practices. Board members in a company occupy a very crucial position and almost all major strategic decisions are taken at their level. The engagement of advanced technology like artificial intelligence in a company's Board increases managerial efficiency in decision making and leads to reduction in agency costs. Artificial intelligence, as an assistant to the Board, enables analysis of a large volume of data within a short period of time and acts unbiasedly when generating outcomes which may enhance the quality of decisions. However, according to the Indian Companies Act 2013, only a natural person can be appointed as a director including independent director in a company and directors are allowed to delegate only a limited power to another natural person. Indian laws are clear that the office of directors cannot be assigned to anybody and does not allow artificial intelligence or any robotic technology to hold the responsibility of directors. The concept of implementing artificial intelligence in board room is still largely theoretical in India due to the lack of legal jurisprudence and so, there is a requirement of a suitable legal framework to encourage the development of artificial intelligence as a tool to assist directors in decision making. Corporate governance practices in the board rooms, in future, might create possibilities that such technologies provide cognitive insights in corporate decision making. Artificial Intelligence system, being a process automation system, can produce and distribute information that the BoD needs in corporate

decision making. However, use of advanced technology for information may hamper the confidentiality of data, especially when it is stored in the cloud mode or data analysis is done off the shelf for information technology products. Another issue is that the data used in AI may not reach in the value chain of information as opposed to real time discussion between the Board members. Directors need to become aware about the nature and importance of data, its reliability on output by AI. In near future, AI might perform the duty of directors in a company, but collaborative intelligence of director and AI based system inside the organization may improve decision efficiency of board and enhance corporate governance practices.

Artificial intelligence in corporate governance process from the legal perspective have also been examined and its potential impacts of corporate laws including guidelines on governance issues have been studies. As per the article, introduction of Artificial intelligence brings efficiency and improvement in business decision process but there are also possibilities of potential danger including harmful impact on third parties, discriminatory practices and privacy breaches. To address this issue of artificial intelligence, European Union, from time to time published many guidelines along with changes in corporate laws. These published guidelines are based on four important pillars viz explicability, fairness, prevention of harm and autonomy. However, the most important is how corporates will translate these guidelines into corporate practices. The outcome of this research article suggests that business will benefit from the use of artificial intelligence, particularly technology with strong ethical guidelines for use of advanced technology. It may be possible that in the near future, any harder legislation instruments on artificial intelligence will emerge but until then legal guidelines are useful for directing business process and their leaders towards trustworthiness of artificial intelligence. Technology enabled digital platforms are

transactional platforms that facilitate interaction between corporate stakeholders. Their features are consistent with network theory applications, where stakeholders are the nodes rotating around the platform. These digital platforms may be considered as new virtual stakeholders that, consistently with network theory, connect conventional partners (shareholders, directors, managers, employees, lenders, clients, suppliers, etc.), representing a bridging node and edge in multilayer networks. Stakeholders are nodes that interact around the hub node, sharing information, and co-creating value within a sustainable digital ecosystem. The shared information through this digital platform network can be fueled in real-time by big data and reduce asymmetries and risk in information systems.

In the fields of governance, strategy, and innovation to discuss the extent to which the institutional, technological, organizational, and competitive environments in which firms operate have changed, and the implications of these changes about the complex interrelationships between innovation and corporate governance. These technological and information changes have a deep impact on corporate governance processes. Corporate governance variables e.g, structure of board, independent director, financial expertise of audit committee and investment in technology have found their impact on objective data frames e.g. accounting variables return on assets, return on equity are dependent variables. The regression analysis indicates that ownership structure of the companies, financial expertise of audit committee and investment in artificial intelligence are explaining the management efficiency of business. Furthermore, digital technologies are well positioned to equip companies with enhanced monitoring capabilities required to address agency problems and thus reduce performance volatility. Furthermore, automated control systems also impose constraints on individual opportunism and outright fraud. For example, artificial

intelligence systems affect organizational management, namely monitoring of web usage, behavior in the workplace. Simultaneously, it also manages large amount of data so managers and employees can make more informed decisions. Today companies in highly regulated sectors such as telecom, banking, and insurance show the greatest adoption of AI based technology, such as machine learning for monitoring regulatory compliance, identifying human errors, and uncovering unexplored business areas. In Europe, big firms are relying on AI to comply with regulations such as the new General Data Protection Regulation (GDPR). AI is being used to detect the flow of personal data through a company's servers and to ensure that data use is compliant with GDPR. However, with many advantages, these innovations are not without problems. Technologies suffer from legacy biases when past events and information guide predictions about the future. Human cognitive biases might not only be reproduced but also amplified by learning algorithms.

The immediate effect of these technologies on corporations concerns the distribution of competences and responsibilities among corporate bodies. This is supported by identifying five primary determinants of the current balance of powers in corporate organizations: (i) the speed and frequency of the decisions; (ii) the information necessary to decide and who has access to it; (iii) the cost of assigning decision-making responsibilities ;(iv) the decision-makers' incentives and interests; and (v) their competence and skills. Looking at whether and how these five dimensions are altered by technological innovation is the essential, and yet unexamined, analytical tool to accurately predict the impact of technology on corporate governance. While technological innovations may simply require managers to possess or acquire new competences and skills to strengthen existing corporate roles. Technology may shift the balance on who is the best decision-maker within the corporation and may reduce some of the transaction costs, for example, decisions

that have been traditionally taken by the board of directors may be made by shareholders. Similarly, competences that have commonly been delegated to executive officers and managers because of the need for operating expertise may shift back to the Board of Directors due to the informational decision-making support provided by technology. The result may not seem revolutionary at first glance, but it may have potentially disruptive consequences for existing corporate governance models threatening the possibility of human agency being replaced, and economic organizations being "flattened" at various levels, from top management to lower levels of skilled personnel. Any such institutional change will be directed within a framework that combines insights from institutional change, technological development, and historical corporate laws reform. This helps to predict that the technological change will be socially mediated and mobilized through an institutional framework towards few possible changes, from facilitative changes, which we are already observing, to disruptive and structural changes, which would require considerable change and are more controversial. A highly automated and anti-hierarchical vision of the future may be some time away, but the institutional framework still places human and social mediation of technology at the heart of the institutional change. The change is ultimately not technology deterministic but is institutionally framed and implemented. Research has examined management efficiency using variables such as corporate governance, technology investment and accounting measures.

1.3 Adoption and investment in AI technology

Artificial intelligence, internet of things and robotisation etc are going to become key drivers of corporate strategy in the coming years. Today, companies are paying high attention to investment in information technology and various digital resources for efficient processing of information

flow. Artificial intelligence infrastructure analyses large volume of data in minimum time without much spending of resources as compared to the human expert. However, granting an artificial entity the status of a director is still questionable since technology does not consider the interest of the stakeholders in a company and can produce the output based on algorithms. The accuracy and efficiency of decisions can be improved with the help of artificial intelligence but at the same time, corporates need to consider the limitations of technology in the Board room. AI and robotic technology presents opportunities in almost all sectors including education, healthcare, research, pharma, financial services etc. However, over-dependency on AI may lead to some risk like loss of data, lack of stakeholders' trust if AI is not operated on ethical principles, although it is also true that principles alone cannot give a guarantee of ethical AI. Firms are making large investment in artificial intelligence and other advanced technology which are influencing corporate decision making to a greater extent, but this technology may erode fundamental values like freedom, democracy and equality. It is possible that in the coming future, technology may substitute human directors and machine will play a more active role in corporate board, leading to Robo-board. Excessive dependence on technology may compel corporates to face several important changes which cannot be fully foreseen, and it may impact the directional liability of firms.

Investment in technology, therefore, contributes positively towards the value of firm but use of technology must be deployed in an ethical way to achieve greater sustainability. India is one of favorite nations as a developer of artificial intelligence system along with many big AI based technology suppliers like TCS, Infosys, Wipro etc and this is attributed to high investment in technology by Indian Industries. In the previous one decade, the demand for AI based technology reached US$ 93 billion in 2021 and it is expected to reach US$ 98.5 billion by the end of 2022

(IBEF Report, 2021). Thus, AI based technology demand is increasing at the rate of 7.3% each year. AI has touched every business irrespective of its size due to its efficiency and productivity. Financial services, education, health care, pharma, transport services - almost all sectors of the society are investing in AI based technology to improve their information processing and decision-making ability. AI based information help corporates to take decision on product demand, price, quality, manufacturing, and distribution etc. Thus, industries are highly focused towards implementation of AI based system to improve the efficiency within the organisation. In India, the adoption of AI based system is showing its magnified effect not only in industry but also in other aspects of human life. In this globalisation era, no country can isolate itself from the positive impact of the advanced technology. However, imposition of advanced technology brings some challenges which can be minimized by instituting the necessary infrastructure and policies. In India, there is a good opportunity to use advanced technology to redress some challenges like shortage of health care, inadequate access to education etc. which may not be fully redressed by use of conventional methods. Government, local administration, and corporations have a major role to play in infrastructure development by investment in technology. The investment in technology undoubtedly creates managerial efficiency of a business but at the same time it has some negative impacts. Investment in artificial intelligence in recent years has profound effects. A well-designed legislation creates an efficient and suitable framework for new technology. A study conducted on top US companies (Premiroso & Bhattacharya, 2007) which were in fortune 500 list and listed on S&P 500 index to test whether investment in technology has any significant influence on firms' financial performance and corporate governance practices. Using financial variables like return on equity, return on assets, expenditures and corporate decision efficiency,

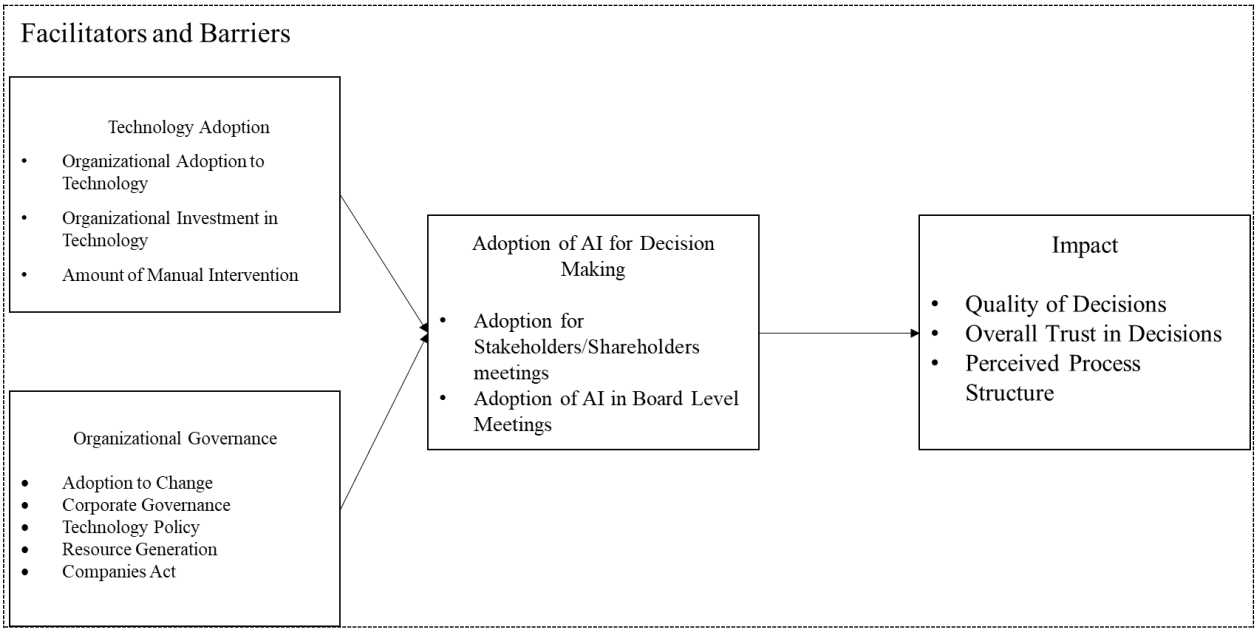
board structure etc, the result of the study suggested that firms' corporate governance ratings are positively related to investment in technology. On the other hand, financial performance appears to be positively associated with board level technology committee. Artificial intelligence, although complex, can generate quick results in minimum time which is not possible for a human expert. But machines have their own limitations. AI-generated output depends on the quality of input and output desired by the decision makers. In some developed countries, where legislation allows AI as an assistant to board members, there are many cases when AI has failed to generate correct output due to faulty data input or some other reasons. This is the limitation of technology; however, on the other side, machines run on the instruction as per algorithms which are designed by humans, use intelligence of humans. The outcome of this article shows that technology has high processing power but not the intelligent quotient of natural persons and so any advanced technology cannot replace human beings completely, although it may be a great assistant to human managers. Technology works on programs set by human brain and thus cannot change as per situation and interest of the institution.

Chapter 2

Exploring the Facilitators and Barriers of Technology Adoption and Artificial Intelligence in Corporate Governance and Strategic Decision Making

3.1 Objective and Conceptual Framework

The survey was meant to understand the facilitators and barriers that impact adoption of technology and AI in decision making and related corporate governance parameters. Certain sub-parameters of facilitators and barriers were identified from the literature and its impact on decision making were assessed. Extensive work in the related area resulted in the conceptual framework for conducting the present survey.



Conceptual Framework for Adoption of AI in Decision Making

3.2 Methodology

The present study adopted a semi structured interviewing process to understand the primary objectives. A schedule-based appointment was done with 6 major company giants. Participants for all the interviews were in Leadership positions, who are also part of board level meetings for their organizations. Detailed discussions were held with Board members of companies such as TCS, McKinsey, PEI-Genesis, Google, etc. on different aspects of technology and corporate governance.

Guiding Questionnaire for the Study

Factors	Related Guiding Questions for semi-structured Interview
Technology Adoption • Organizational Adoption to Technology • Organizational Investment in Technology • Amount of Manual Intervention	1. Do you think that AI Based Technology adoption has been useful for your organization? 2. Do you think that employees in your organization are easily able to use AI based technology for decision making? Kindly give reasons. 3. Since how long your organization has been planning for adoption of AI based technology for decision making especially for board room decision making.

	4. Do you think that the funds for new technologies, especially in pandemic times, may be the biggest limiting factor? If so, how do you plan to overcome this limitation? 5. Other than funds, are there any other limitations to the induction of modern technologies in the company? Are there any facilitating factors also? 6. Do you think manual intervention in AI based decisions are a facilitating factor or barrier? Please explain.
Organizational Governance • Adoption to Change • Corporate Governance • Technology Policy • Resource Generation	7. According to you, what key changes have occurred in decision-making in the company? How were these changes initiated and what other changes did they require, if any? 8. What factors, in your view, are impacting corporate governance in current times? What role does technology play; what role should technology play in your view? 9. What is the Technology policy of the company? How do you see it evolving in the next three-four years?

	10. Data gathering and data analysis is a crucial requirement for success of AI. How is the organization getting ready to build capacity in appropriate data gathering, storage and analysis? Are collaborations with other organizations being sought for? How are organizations selected / planned to be selected for collaboration? 11. Technology adoption is driven by many factors. Has creation of Multidisciplinary Teams ever been an objective of technology adoption?
Regulatory Framework	12. Are you looking for changes in legislation, particularly Companies' Act that may help in expediting the use of higher levels of technology? Are you looking for changes in legislation, particularly Companies' Act that may help in expediting use of higher levels of technology? What are the problems that Companies' Act changes may help solve? 13. How big is the issue of legislation on data protection in decisions regarding adoption of AI, particularly by senior management in the

	company? Do you think the present data protection/localisation legislation creates barriers in the achievement of financial goals, especially in the case of business-to-business collaborations? 14. Do you think that the Board of Directors in companies is ready to take up additional duties of Data Governance including cyber-security, if mandated through amendments in the Companies Act? What if the Companies Act makes the Board responsible for the ethical implications of AI? 15. Do you think AI in the boardrooms can help incline the companies more towards ESG goals and check short-termism? 16. What is your view on a Driverless corporation or a Driverless subsidiary? How remote is this possibility?
Adoption of AI for Decision-Making	17. Which key strategic decisions at the Board level may be said to have been impacted by the use of Artificial Intelligence / Internet of Things in other departments? 18. Is Artificial Intelligence being employed at the Board level? Is it, for example, being employed

	to assist decision-making in key Board meetings? What were the key decisions in which AI was employed and, according to you, did it significantly change decision-making? 19. Is AI employed in shareholders' meetings? Is there any attempt to predict the outcomes of the meetings with the help of predictive analytics? How often is predictive analytics employed? What determines its use?
Impact • Quality of Decisions • Trust on Decisions • Perceived Process Structure	20. Which type of AI has been found to be most effective in decision-making? How is the effectiveness of AI measured? 21. How much does the board trust the decision making through AI usage? 22. How is the final process of decision making approached by the board?

3.3 Results

A thematic analysis was done to understand the results of the primary data. The major themes that were generated after analysis were:

Organizational Investment in Technology- Nearly all the participants of the interview suggested that technology cannot be introduced arbitrarily. The scale of operations needs to be analyzed before an investment is done on technology. For companies with smaller scale of operations, many a times, the investment of huge scale is not required in technology, but the investment should be more process driven. If technology expenditure takes priority over others in the organization, then the clear purpose is digitization. At the level of shareholders too, it is important as they should be able to visualize the returns to investment that is coming through their investment in technology for the organizations. The kind of data-mining strategies that are used for the organizations provide emerging areas of data usage, encourage institutional investors. The ability to grow is assessed through information on organizational investment in technology as reported in the company Annual Reports.

Human Intervention in Board level decisions – The use of technology acts as a facilitator in the decision-making process. Reliance on AI and Technology acts as a facilitator in the decision-making process, and organizations should not treat adoption of technology as an end unto itself. One of the leaders mentioned that any small error with technology has a huge propensity to impact the organization in terms of scale and magnitude. Hence, one cannot overlook or rule out the role of manual intervention as the experiential components and historical data with related contexts are human-specific and not machine-specific. AI is an instrument for optimized conclusions. At Board level, there are also issues of ethics, which the machines cannot identify and the manual judgements become primary. Hence the recognition patterns of technology usage cannot compensate the board level decision making. Technology will move up the value chain but the

design and control should be manually determined. Hence the governance of AI systems gains primary importance.

Ease of use and adaptability

The companies might take people as their resources from diverse background, who need not be technology experts, but providing them appropriate training in the job role with technology imbibing model, their skills develop. This helps the people to grow. The adaptability to technology in the models of their roles have not been a deterrent. However, they should be able to correlate with their area of expertise with the usage of technology. All one needs to have is the grasp that how technology is to be applied to their functional role and business.

Organizational and Corporate Governance

Adoption to change: The B2B and B2C relationships call for reliance on technology with good governance mechanisms. It ensures that those organizations in partnership, the acknowledgement of missing infrastructure, proactive approach to adapt to need if the factors and components are missed is required. Once an organization demonstrates that they can move faster by setting an example for change, the willingness to work with both internal and external customers. The thought process is that can various elements from both technology and management of technology, can be brought to manage the future readiness for organizations.

Technology Policy: The whole idea of investment in technology is transformation in various areas which should improve processes and systems of corporate governance. There are business

processes in functional areas like HR, finance etc. that can be improved with technology and contribute towards good governance.

Resource Generation: The biggest challenge is scale of operations. To achieve scale they have to reach out to others, who have resources and frameworks. Hence to an extent for the other companies by facilitating the technology interface and frameworks is a part of their resource creation and resource generation. It helps them in accelerating their operations; thereby, creating more resources that are needed by them. The good governance system in place helps them sustain their cycle of resource creation/generation and maintain operational efficiency. Often, organizations would like to show that they have efficient processes in place so that the business to business / partnership relationships are maintained. Sometimes, it may get complex as organizations also need to maintain their mandate, e.g., for the petrochemical industry, health safety mechanisms are a priority and they have to figure out ways through technology to maintain and sustain their employee resource. The organizations' ability and preparedness to maintain their infrastructure also needs to be considered.

Companies Act/ Compliance Issues and Regulatory Framework:

Compliance issues are important whenever the organizations invest in technology. The primary barrier is the data security issues. There is a lot of effort required to protect confidential data, the breach of which could impose heavy penalties. Banks are too well aware of the Anti Money Laundering (AML) regulations that compel them to invest in the most sophisticated technology. Besides, governmental regulations vary from geography to geography. There may be some overarching regulations like environment or carbon emission regulations which may be

voluntary but require clarity on the part of organizations on the extent to which they will adopt these regulations and the time-table for the same – something that will determine both the data collection that will be required and the appropriate technology. So, there are teams that decide on the nature of data to be collected and there are teams that govern the analysis of data. Adherence to compliance regulations ensures greater credibility in the practice of governance systems and in the eyes of the customers.

However, organizations have also to ensure that every investment in technology is making a business case; otherwise, it will be a redundant phenomenon. It is the business case that has to determine the extent and the type of technology to invest in. Besides, the internal processes need to be re-looked at and revised, if necessary, with every induction of technology. Often, the change in the internal processes is too slow and hence is not in tune with the requirements as per the infusion of technology. For example, more automation often requires human monitoring of machine results at more frequent intervals to guard against the scale and magnitude of error that may occur owing to the sheer data and speed with which data is being handled by machines. Any error can be too costly for the organization; hence, internal processes must provide for different layers of human intervention at more frequent intervals. Governance of AI systems has to take priority in organizations. Surely, all this cost and constant monitoring can at times be very cumbersome for small and medium enterprises which are hard pressed for resources. Often simple technology like Robotic Process Automation (RPA) may be more appropriate for their needs as opposed to Artificial Intelligence (AI) or Internet of Things (IoT).

Adoption of AI/ Technology for Decision-Making

Adoption of Technology for Board Level Decision making:

The responses to internal power structures change the way decisions are made. There are specific frameworks that work which involve investments that companies make, be it in technology or people. Feedback generation and analysis mechanisms are instituted to validate decisions and improve efficiencies. Shareholders' meetings often become a primary mechanism to encourage deliberations/ brain-storming post which the Board of Directors takes a final call. Apart from the machine analysis and views expressed at different levels, the Board takes into account the context in which decisions are being taken and its own experience. Shareholders usually do not question the technology the organization intends to use or the geography/ region the organization wishes to go to. Shareholders may require data-backed explanation of decisions proposed to be taken – a specific area in which rapid and unbiased visualization of data is possible through technology. Boards, nowadays, are highly diverse with diverse sets of people having expertise in different areas coming together and sharing their cognitive perspectives on resource management, training, skill development, and these inputs provide perspectives on how technology can capture the questions and facilitate greater operational efficiencies. The knowledge that different board members bring provides direction to the organizations for enriched decision-making perspectives. The executive board members bring the application perspective of the knowledge and functional areas and the independent directors may bring in expert knowledge on developments in technology, AI, Big data etc., and how organizations can use them or benefit from them. However experiential component facilitates the final decision-making process and technology/ AI provides input to the board.

Impact

Quality of Decisions / Trust on Decisions / Perceived Process Structure

Independent directors are an important component of the Board of Directors as they bring in rich experience and expert knowledge to the organizations that enriches the quality of board level decisions. Increased participation by independent directors has been made possible through use of technology. The proportion of issues taken up at the board level is also rising as big data analysis facilitated by technology enables the boards to take up new and complex issues. The competences that have commonly been delegated to executive officers and managers because of the need for operating expertise may shift back to the board of directors due to the informational decision-making support provided by technological tools. The trust in decision making is still in the ownership and accountability of the board level wisdom. The technology interfaces can improve the quality of decisions by providing a perspective to be utilized for the process of decision making. The perceived structural processes in the corporate governance mechanisms and domains improves because of objective data sources which act as an additional tool to facilitators. Similarly, certain board level issues may be handled at the operating levels due to ease of analysis facilitated by technology. Hence, there is large-scale optimism that investment in technology shall bring in improvements in work practices, performance and corporate governance systems.

CHAPTER 3

Technology Intensiveness and Firm Performance – Analysis from Annual Reports of Listed Companies

3.1 Objective and Methodology

The primary survey conducted for the Study showed that Corporate Boards, in general, are receptive to technological changes that have the potential to increase the competitive positioning of the companies. In fact, the board members themselves have received training on the emerging technologies in their respective fields. There is no doubt that corporate boards see technology as a potent leverage assisting them to wade through the uncertainties with data-driven decision making. Against such observations from the board members, data on variables indicating the technological intensiveness, financial performance and corporate governance was collected from the Annual reports of about 60 listed companies for the period 2016-17 to 2020-21. The companies were first grouped into the following categories:

- **Large companies**
- **Public sector companies**
- **Small non-tech companies**
- **Small tech companies**
- **Foreign companies operating in India**

The variables on which data was gathered were as follows:

- Total Intangible Assets (as an indicator of technological spend)
- Per cent of Intangible Assets to Total Assets (measuring technological intensiveness)
- Price/Net Operating Revenue (measuring market perceptions on impact of changes in the companies)
- Institutional Shareholding as Percent of Total Float (measuring perception of institutional stakeholders
- ESG scores prepared by sustainalytics.com and available on finance.yahoo.com
- ISS Corporate Governance Quality scores and sub-scores prepared by Institutional Shareholder Services (ISS) and available on finance.yahoo.com

3.2 Analysis – Relationship between Technology intensiveness and Price -Revenue Multiples

a) Analysis – Large Companies

Table 1 presents figures relating to a sub-sample of large companies listed on the stock exchanges in India. Large companies usually have the resources to invest in technology and are willing to commit funds if seen to provide direct benefits. The tables show that large Indian companies have continued to make additional investments in intangible assets such as computer software etc. throughout the 2016-17 to 2020-21 period. Certainly, some of these investments were driven by the pandemic since 2020. Specific observations are as follows:

i) The average investment of the 14 large companies in the sample has risen from Rs 1032.55 crore in 2016-17 to Rs 1463.52 crore in 2020-21. Mahindra & Mahindra Ltd has made comparatively large investments in intangible assets with the investment

almost doubling by 2020-21 from its 2016-17 level of Rs 1234 crore. At Maruti, on the other hand, the investment in intangible assets has been low and has, in fact, fallen from its 2016-17 level of Rs 373 crore to Rs 224 crore. The level of intangible assets at Rs 839 crore in 2020-21 has been high at Tata Steel but has not seen any sharp increase over the five year period studied. The average investment of all companies during the entire period came at Rs 1087.48 crore which was higher than the Rs 1032.55 crore level of 2016-17, thus showing that intangible assets over the period had risen in the sample of companies studied. Hindustan Unilever Ltd had experienced disproportionately high levels of investment in intangible assets in 2020-21 and was, therefore, not included in the sample of large companies.

ii) Next, the study team looked at the proportion of intangible assets to total assets of the sample of 14 companies. It was observed that because the companies were investing simultaneously in tangible assets as well during the period 2016-17 to 2020-21, the proportion of intangible assets to total fixed assets has decreased from its level of 7.19% of 2016-17 to 5.62% in 2020-21. The average of all companies over the entire period stood at 6.16% with the proportions falling throughout the study period. Though the proportion of investment in intangible assets at Bajaj Finance, Dr Reddy's Laboratories and Mahindra & Mahindra Ltd was high at 19.93, 14.84 and 15.37 respectively in 2020-21, as seen earlier, in terms of the quantum and growth of investment in intangible assets, Mahindra & Mahindra Ltd was clearly far ahead. At Dr Reddy's Laboratories,

the proportion of investment in intangible assets to total assets had fallen drastically from the level of 33.58 in 2016-17.

iii) As the world economy becomes more knowledge and technology intensive with new technologies like block chain, internet of things (IoT) or artificial intelligence becoming more mainstream, the valuation or price multiples of such companies in stock markets tends to rise simultaneously if technology is prudently selected to serve a business case, something that large companies can more easily control than small companies. The valuation multiple taken up in the Study was Price/Net Operating Revenue and a relationship between the proportion of investment in intangible assets and this multiple was analyzed with the help of Correlations for the sample of companies studied. The correlations, as seen in Table 1, have been positive throughout the five year period and rose from 0.09 in 2016-17 to 0.27 in 2020-21 after a sharp drop to 0.05 in 2019-20. Thus, there appears to be some parallel movement in the two variables – investment in intangible assets and net revenue multiple but the movement is not very significant. With only about 6% of assets invested in intangible assets, their impact on valuations has not been significantly large, though the price-revenue multiple has risen from 3.94 in 2016-17 to an average level of 4.18 over the five year period.

b) Analysis – Small Companies

Small companies are the backbone of any economy. Although their technology spends are extremely small when compared with the spends by the large companies, there is sufficient

variation between the small companies themselves due to which two categories of small companies were formed: Small companies - Nontech and Small Tech companies (Table 2). Major observations are as follows:

i) The average investment in intangible assets in non-tech small companies has remained at a low level of Rs 6 crore. Over the five year period, the investment has gone up marginally from Rs 6.04 crore to Rs 6.57 crore in 2020-21. In the sample of eight non-tech companies, only two companies – JK Paper and Gujarat Narmada Fertilizers Corporation have some meaningful investment in intangible assets at Rs 19.29 crore and Rs 21.10 crore in 2020-21. The investment by tech companies in 2016-17 was approximately four times at Rs 25 crore but over the period until 2020-21, the investment in intangible assets by small tech companies has continuously declined to Rs 15.44 crore.

ii) In terms of the proportion of investment in intangible assets to total assets, both small tech companies and small non tech companies have seen a decline from 2.31 to 0.87 and from 1.01 to 0.59 respectively from 2016-17 to 2020-21.

iii) While the technology base of small companies has shrunk, the price-revenue multiples of companies in both categories has increased from 1.585 for non-tech small companies and 5.46 for small tech companies to 2.65 and 11.12 respectively.

iv) In case of non-tech small companies, the correlation of price-revenue multiples with the proportion of investment in intangibles has been fairly high around 0.52 in 2016-17 and the correlations between investment in tangible assets and price-revenue 0.41 in 2020-21. With technology levels steady in these companies, the impact on price-

revenue multiples has been favorable. However, in the case of small tech co multiples have been negative throughout 2016-17 to 2020-21. Thus, it appears that in case of small tech companies, factors other than technology intensiveness of these companies have been dominant in lifting their price-revenue multiples. This, thus, is a major difference between small non-tech companies and small tech companies.

c) Analysis – Public Sector Companies

i) Table 3 shows that public sector companies have had a big increase in their technology spends represented by investment in intangible assets over the study period. The average investment in intangible assets rose from Rs 597.45 crore in 2016-17 to Rs 729.43 crore in 2020-2021, thus registering a higher growth rate as compared to the growth rate in large private sector companies. The top four companies with high technological spends were GAIL, Indian Oil Corporation, MTNL and Power Grid Corporation. While GAIL, Indian Oil Corporation and Power Grid Corporation almost doubled their investment from the 2016-17 levels, MTNL's investment in intangible assets was down by more than 30% by 2020-21. HAL, too, showed a decline in investment in intangible assets by the same margin over the five year period.

ii) MTNL's and HAL's investment in intangible assets as a proportion of total assets also came down markedly from 42.33% and 17.3% in 2016-17 to 38.29% and 9.88% respectively by 2020-21. Spectrum formed a dominating component of MTNL's intangible assets. BEML showed the same trends with the proportion falling from 8.06% to 5.7% during the same time period.

iii) The heavy investment in technology notwithstanding, the ratio of Price to Net Operating Revenues had been declining since 2016-17 and jumped only in 2021 to 4.32, thus rising from its 2016-17 level of 2.54. This was largely due to IRCTC whose revenue multiple rose to 35.88 in 2020-21 from just 6.91 in the previous year and 12.61

in 2016-17. This got translated into negative correlations between investment in technology and the revenue multiples.

d) Analysis – Foreign Companies listed in India

i) Table 4 provides data on foreign companies in India. As seen in the table, foreign companies' investments in intangible assets in India have been at a low key rising from only Rs 25.13 crore in 2016-17 to Rs 34.76 crore in 2020-21 and Rs 27.13 crore over the entire five year period. Cipla Pharmaceutical's investment in intangible assets has been the highest at Rs 269.51 crore in 2020-21 rising from Rs 140.1 crore in 2016-17. In the sample of companies selected, Havell India's investment in intangible assets had significantly risen in 2017-18 itself from a low level of Rs 18.16 crore in 2016-17 to Rs 1483.47 crore and remained at around the same level until 2020-21. Since it was an outlier in the group of companies selected, this company was not selected in the final sample of companies selected for further analysis.

ii) The top four companies in the sample of 14 foreign companies in terms of the proportion of investment in intangible assets to total assets were the two pharmaceutical companies – Glaxo Smithkline and Cipla and two tech companies – Agro Tech Foods and Redington India. All other companies' proportion of investment in intangible assets stood at less than 2% with figures of 0.03% and 0.04% of total assets for Cummins India and Siemens India respectively.

iii) However, the top four investors in technology were behind 3M India, Jubilant Foodworks and Bata India in terms of Price/Net Operating Revenue which registered ratios of 14.07, 11.76 and 10.57 respectively in 2020-21. Glaxo Smithkline, Cipla, Agro Tech Foods and Redington India, on the other hand, had registered ratios of 7.64, 4.73, 2.29 and 0.33 respectively. This got reflected in negative correlations between proportion of investment in intangible assets and price-revenue multiples which are even lower than those for Indian public sector companies.

3.3 Relationship between Technology intensiveness and Corporate Governance indicators

Technology intensiveness, as in Part I, was defined as Intangible Assets/Total Assets. The relationship with corporate governance indicators was studied both directly and indirectly through price-revenue multiples. Corporate governance risk scores prepared by the following were adopted in the Study:

- Institutional Shareholder Services (ISS)

  The governance risk scores indicate rank relative to index or region and range from 1-10 with 1 indicating least corporate governance risk

- Sustainalytics.com

  Environment, Social and Governance Risk Ratings with 1 indicating least risk

Corporate governance risk scores, though, were available only for companies that are mandatorily required to submit corporate governance reports. These are the top 1000 companies listed on Indian stock exchanges. Risk scores for small companies, thus, was not available. Alternative data indicating corporate governance such as share of institutional holding was, thereby, used for analysis for this group of companies. Results with alternative data are presented below for other group of companies as well.

e. <u>Corporate Governance Measures of Large Companies</u>

In the sample of 14 large companies, corporate governance scores have been shown for different parameters such as Audit Risk, Board Risk, Shareholders' Rights Risk relating to the ISS Governance Risk and Environmental, Social and Governance (ESG) risks under the overall ESG rating. Observations are as follows:

- The least risk for large companies is that relating to shareholders' rights. Surely, shareholders are being given their due rights largely due to the mandatory processes put in place by SEBI. Overall, the risks are somewhat midway on the governance scale. Yet, it is somewhat disconcerting to see some of our most respected companies like Larsen & Toubro, Bajaj Finance and HeroMoto Corp being scored at the highest risk level in sub-components like Compensation Risk, Audit Risk and Board Risk respectively. Average Board Risk at 5.77 in the ISS Governance Risk has also been the highest. However, the saving grace is that at least six of our large companies out of the 14 large companies have scored a risk score of 1 when it comes to shareholders' rights.

- On the relationship between technology intensiveness and corporate governance indicators, the relationship is the strongest when correlations are computed with Board risks, Governance risk rating and Environment risk rating. Negative correlations, for example, with Board risks mean that as the proportion of investment in intangible assets rises in the large companies, the risks arising due to the composition of the Board / frequency of meetings, disclosure of related party transactions etc. start to decline. Technology brings in the much-needed transparency and the greatest change at the top most layer of decision-making. Amongst the ESG risks, technology again has the highest potential to bring down governance risks.

- The scores of Table 5 also show that the journey from good corporate governance to better performance indicators gains visibility through the Price/Net Operating Revenues ratio. The correlations of Price/New Operating Revenue with Board risks and overall Governance risks are also negative, though somewhat less strong than with the proportion of investment in intangible assets.

f. <u>Corporate Governance Measures of Public Sector Companies</u>

- Public sector companies, like large companies, also face high Board Risks and in addition high Audit Risks as well. This alone could have made their overall ISS Governance risk reach levels much higher than those of large companies of the private sector, had it not been for the absolutely low risk relating to Compensation Risk on account of their being

public sector companies. Amongst the ESG ratings, the environmental risks have also been relatively higher.

- What is striking, however, from Table 6 is that the correlations of the proportion of investment in intangible assets are negative for all the ISS Governance and ESG risk scores. Earlier, from Table 1, it was seen that the public sector companies have made large investments in intangible assets / technology and with negative correlations with risk measures, it is evident that there has been a dampening effect on the risk scores due to higher technology intensiveness.

- However, the improved risk scores have not got translated into better performance measures for this group of companies. The correlations of price-revenue multiples with risk scores are all positive except for the risk score relating to shareholder rights.

g. Corporate Governance Measures of Foreign Companies listed in India

- Overall ESG risks of foreign companies listed in India are similar to ESG risks of public sector companies of India and higher than those of large private sector companies of India. Social risks of foreign companies with a score of 16.9 in 2021-22 are particularly higher as compared to scores of 10.78 and 13.00 for large private sector companies and public

sector companies respectively. On environmental front, their risk rating is the same as that of large private sector companies in India.

- The ISS Governance risk scores too show that there is high compensation risk in foreign companies listed in India that is even higher than the compensation risk of large private sector companies in India. However, despite the higher compensation risk score, their overall ISS Governance risk score at 3.5 is lower that the scores of 5.31 and 5.44 of large private sector companies and public sector companies of India respectively. This is on account of the lower Board Risks and Audit Risks in foreign companies that have scores of 3.25 and 4.75 as against 5.77 and 5.08 for large companies and 7.22 and 6.11 for public sector companies of India.

- The correlations of the proportion of investment in intangible assets with the different corporate governance risks other than compensation risk are negative like in the case of other groups of companies. Clearly, technology cannot solve social risks that require humane employee policies. The negative correlation between compensation risk and price-revenue multiple of -0.39 in foreign companies fortunately shows that as performance measures in companies improve, they take better care of their employees.

h. <u>Corporate Governance Measures of Small Companies in India</u>

- In the case of small companies, risk scores are not available as they are still not mandatorily required to prepare risk reports. That is why, alternative data such as percent of float held by institutions and the number of institutional holders in these companies was used as indicators of corporate governance. In some previous research, it has been shown that there is a negative correlation between high institutional holdings and corporate governance risk. Since higher technology adoption leads to higher transparency in processes and decision-making, it is expected that there will be a positive correlation between these institutional holdings and the proportion of investment in intangible assets. Table 8 shows that this correlation at 0.595 is high in the case of small companies.

- Alternative data was used for other groups of companies only for comparison purpose with the results in small companies. In the case of public sector companies and large private sector companies, there is a clear positive association between institutional holdings and the price-revenue multiples.

CHAPTER 4

Summary

The present project had two main deliverables:

a) The understanding of the facilitators and barriers of technology adoption and artificial intelligence in corporate governance and strategic decision making.
b) Technology intensiveness and firm performance from the select listed companies.

The deliverables were achieved by using a three-pronged approach involving qualitative and quantitative data gathering and analysis thereof. The first deliverable was achieved by using a qualitative survey method and doing a thematic content analysis.

The second deliverable was achieved by objectively analyzing the annual reports of the select listed companies.

The main highlights of the studies were:

a) The scale of operations needs to be analyzed before an investment is done in technology and the shareholders should perceive acceptable ROI from use of technology.
b) Technology acts as a facilitator in the decision-making process, and if technology moves up the value-chain in the organizations, then the governance of AI systems becomes primary.
c) It is important to provide regular tech-related training to employees as technology is very dynamic. Tech experts as team members enhance team performance greatly and that is why

the Board of Directors also nowadays generally have tech experts can similarly consist of members of varying skills.

d) The various elements from both technology and management of technology can be designed to manage the future readiness for organizations along with efficient corporate governance systems.

e) The extent of companies facilitating technology leads to accelerated resource creation and resource generation. Good governance system in place helps them sustain their cycle of resource creation/generation and maintain operational efficiency.

f) Compliance issues are important especially for technology over-reliant companies wherein the primary challenge is data security. Data confidentiality and protection of data along with meeting government guidelines are a big challenge for companies nowadays.

g) The independent directors and the executive members of the Board bring in different sources of knowledge base to the process of decision making. The executive positions bring in the perspective of application of knowledge relating to functional areas through technology to enhance the organizational processes. The experiential component coming from other members facilitates the final decision-making process and technology/ AI provides a role in this as well.

h) Despite extensive induction of technology, trust in decision making is still based on the ownership and accountability of the board level wisdom. Technology helps in improving the structural processes in the corporate governance mechanisms because of objective data sources and, thereby, acts as an additional tool for decision-making.

i) The investment in intangible assets has risen in the sample of large companies studied. The large companies have shown inconsistent pattern of investment in intangible assets, wherein a few have invested significantly more than the others. With only about 6% of assets invested in intangible assets, their impact on valuations has not been significantly felt, though the price-revenue multiple has risen.

j) The proportion of investment in intangible assets to total assets in both small tech companies and small non tech companies have seen a decline. Factors other than technology intensiveness have been dominant in lifting their price-revenue multiples. This also correlated with the survey data, that increased investment by technology oriented companies results in beneficial impact through in economies of scale.

k) For public sector companies, the present study indicated an increase in their technology spends. The average investment in intangible assets registered a higher growth rate as compared to the growth rate in large private sector companies. With the heavy investment in technology, the ratio of Price to Net Operating Revenues had showed an increase in 2021 compared to previous years.

l) For technology intensiveness and corporate governance indicators, the relationship is the strongest when correlations are computed with Board risks, Governance risk rating and Environment risk rating. With the proportion of investment in intangible assets rising in large companies, the risks arising due to the composition of the Board / frequency of meetings, disclosure of related party transactions etc. start to decline.

m) For Public sector companies, the intangible assets are negatively related to ISS Governance and ESG risk scores, indicating that higher technology intensiveness leads to lowered impact on risk scores.

n) The overall ESG risks of foreign companies listed in India are at the same level as ESG risks of public sector companies of India and higher than those of large private sector companies. The results indicate that social risks have remained high in foreign companies despite their being fairly high on technology front.

o) For small companies, since higher technology adoption leads to higher transparency in processes and decision-making, a positive correlation between their institutional holdings and the proportion of investment in intangible assets was also evident from the data presented in Annual Reports.

Conclusion

The present research project was intended to understand the perspectives on current and near-future technological developments - distributed ledger technologies, "smarter" forms of automation and artificial intelligence which are likely to disrupt the current and open scope for newer models of corporate governance discussions. There is a lot of interest in emerging technologies but how the different types of corporations are adapting to them and their impact on tangible and non-tangible organizational factors is reflected in the present study. The Study shows that different stakeholders in the technological space and the corporate governance space are moving at different speeds in different industries as per their requirement and business feasibility

case. It is clear that all companies are keen to understand the transformation that these technologies can bring in and how future business/corporate governance models may undergo a change in the future. They are also conscious that the success of any technology would require suitable modifications in the internal processes allowing for more frequent human supervision that may help forestall possibilities of wide scale damage owing to any technical error. The Boards of Directors, in general, from the sample of companies studied, have been found to be highly receptive to change, willing to experiment and learn and assess alternative technologies before committing investment in any one of them.