

Understanding Leaders' Artificial Intelligence-Driven Capabilities: Evidence from the Financial Services Industry

Sahadat Hossain (Corresponding Author)
PhD Candidate, Faculty of Business and Law
University of Wollongong NSW 2522 Australia
E: shossain@uow.edu.au T +61 4 1467 8227

Dr Mario Fernando (he/him)
Professor of Management, Faculty of Business and Law
Director, Centre for Cross-Cultural Management (CCCM)
University of Wollongong NSW 2522 Australia
E: mariof@uow.edu.au T +61 4 3283 4008

Professor Shahriar Akter, PhD
Associate Dean (Research), Faculty of Business & Law
Room 40.337 | University of Wollongong NSW 2522 Australia
E: sakter@uow.edu.au T +61 2 4221 3377

ABSTRACT

Artificial Intelligence (AI) is transforming organizations' business models, structure, and decision-making processes. Leaders face enormous ethical challenges in balancing the competing interests of various stakeholders while adopting AI in the organization. To address those challenges, leaders must focus on developing collaborative human-machine capabilities. Such collaborative capabilities will create more responsible and sustainable organizational outcomes in the increasingly complex AI environment. Using Dynamic Managerial Capability (DMC) as our theoretical framework, we conducted 20 semi-structured interviews to explore the dimensions of leaders' capabilities in AI environments. We aim to identify the leaders' essential AI-driven capabilities and offer an integrated capability framework to manage increasingly AI-driven organizations successfully. Our research findings show how leaders could use AI-driven capabilities to learn, improve, and adapt to the opportunities in an AI environment. Highlighting the recent leadership trends related to AI, we offer future research avenues to uncover opportunities for leaders in AI-driven organizations.

Keywords: ethical issues of emerging technologies; leadership; AI-driven capabilities

INTRODUCTION

The use of artificial intelligence (AI) continues to grow in various areas of economies across the world. By 2030, AI will contribute \$15.7 trillion to the global economy, and increased productivity will contribute \$6.6 trillion (PwC 2017). Currently 35% of all businesses use AI to various degrees, and 42% of other businesses plan to use AI soon in the near future (Dennison 2023). Besides the increasing adoption of AI, new challenges emerge to mitigate the negative impacts. AI creates various societal concerns and organizational leaders have a vital role in mitigating those concerns (Raisch and Krakowski 2021). However, organizational leaders face challenges in balancing the competing interest of stakeholders. Balancing between the organization's business objectives and responsible digital practices is challenging (Yokoi et al. 2023). For example, data localization requirements often contradict the efficiency of globally distributed value chain. Similarly, ethical scrutiny of AI algorithms tends to slow the AI-based project developments in organizations (Yokoi et al. 2023).

Increasing AI applications across industries has driven scholars to pay attention to investigate the role of AI in various contexts. Still, ensuring the benefits against the drawbacks of AI remains a significant challenge for organizational stakeholders (Johansson and Björkman 2018). Recent AI research in management focuses on competitive advantage (Kemp 2023; Krakowski et al. 2022); leadership behaviors (Tsai et al. 2022); digital leadership (Banks et al. 2022); organizational learning (Balasubramanian et al. 2021); leadership traits (Doornenbal et al. 2021); employment relationships (Varma et al. 2022); bias mitigation (Choudhury et al. 2020); perceived users' value (Gregory et al. 2021); organizational design choices (Murray et al. 2021); individual morality (Giroux et al. 2022; Tóth et al. 2022); ethical and cultural implications (Wright and Schultz 2018); paradoxical automation-augmentation organizational outcome (Raisch and Krakowski 2021). Particularly, more attention to the individual-level capabilities will aid in addressing the leadership challenges. Extant research shows that leaders' role will be vital in an advanced AI application era (Agrawal et al. 2017; Wilson and Daugherty 2018; Kolbjørnsrud 2017; Davenport and Kirby, 2016). However, a key area for the current research priorities is to explore the specific capabilities required for the collaborative human-machine era. AI-driven capability refers to the leaders' capacity to think and act in human-machine collaborative ways to lead in an AI-driven organizational environment. Based on the evidence from the financial services industry, we explore the dimensions of leader's AI-driven capability relevant to the responsible AI adoption in the organizations.

The emergence of evolving AI increases uncertain organizational circumstances. In a complex organizational context, dynamic capabilities are critical in dealing with uncertainties (Schoemaker 2018) and responsible behaviors (Samimi 2020) for better performance. We adopt a dynamic managerial capability (DMC) (Adner and Helfat 2003) theoretical approach to explore a leader's AI-driven capabilities. Because, AI-driven organizations operate in a relatively uncertain and volatile environment. DMC is difficult to configure and deploy, and often works in specific contexts (Helfat and Martin 2015). Extant research has investigated DMC in ambidexterity, competitive dynamics, innovation, diversification, and strategic renewal (Helfat and Martin, 2015). Uncovering the AI-driven capability dimensions will create new insights to conceptualize DMC in an increasingly AI-driven organizational context. In AI environments, the role of AI-driven capabilities is vital for leadership to address emerging challenges and direct organization to the right strategic path (Wilson and Daugherty 2018; Davenport 2016). Thus we seek to address the following research question:

RQ: What are the dimensions of leaders' AI-driven capabilities?

We aim to explore the required AI-driven capabilities for financial services industry leaders. Deducing the AI-driven capability dimensions, we offer crucial directions to scholars and guidance to practitioners. Theoretically, we extend the emerging discourse of leadership by introducing AI-driven capability. Notably, we explore the dimensions of AI-driven capability as DMC, which influences leadership behaviors. Practically, we highlight the dimensions of AI-driven capability and contribute by illustrating how organizations can operationalize those capabilities. AI is widely used in police, schools, businesses, and hospitals, requiring human capabilities to address emerging challenges (Balasubramanian et al. 2021).

The rest of the paper is structured as follows. First, we discuss the ethical concerns in the AI landscape and the role of leadership in them. Then, we clarify the theoretical underpinning of DMC, followed by a discussion on the interview methods of participants and questions, sampling and data collection, data analysis, and trustworthiness. Then we present the interview findings with identified themes. Lastly, we address interview findings' theoretical and practical implications while highlighting the limitations and future research avenues.

LITERATURE REVIEW

The AI Landscape

Over the years, scholars and practitioners have paid greater attention to the benefits than the dark sides of AI. Senior management must play a vital role in addressing the challenges that emerge from the dark side of AI. For example, Optus scandal in Australia 2022 found the board members were lacking adequate knowledge in constantly evolving technology and cyber security threats (Tong 2022). The academic community paid relatively little attention to the dark aspects of AI. AI can induce risks at individual, organizational and societal levels which significantly offset the benefits of digitalization (Alt 2018). In the individual level, AI negatively impact through privacy concerns, content, and product recommendations (Grewal 2021). For example, voice assistants like Alexa analyze customers' voices and predict the moments by using AI technology. Another example is facial recognition-based payments that exacerbates the privacy risks. Because human face depicts various personal information including gender appearance, age etc. Personalized information often leads to perceived information narrowing and privacy concern which results in resistance to the concerned technologies (Li 2021).

From an organizational perspective, AI-based products may impact the reputation and profitability of the companies. For example, when AI-enabled chatbots do not deliver to the expectations, a trust gap is created between the customers and companies (Yen and Chiang 2020). Besides, organizations also face challenges to assess the impact of AI technologies on workforces while implementing AI strategies (Cheng et al. 2022). From a societal standpoint, AI yields ethical problems like widespread concern for the human workforce. Beyond ecommerce, AI is increasingly occupying many spheres of our daily lives and likely to increase unemployment. Moreover, at societal levels, issues like AI fairness and discrimination, AI regulation, and moral dilemmas are posing increasing challenges for AI governance (Wirtz et al. 2020).

AI and Leadership

Cloud-based data processing has started to emerge with technology, geography, and policy issues for organizations. Combined with AI, analytics, the Internet of Things, and virtual and augmented reality impacts business strategies (Davenport 2019). Such an emerging AI landscape raises more ethical concerns for the organizations. AI's ethical risks also increase because of inherent algorithmic complexities, rapidly changing external environment and probability-based decisions

(Babic 2021). AI's ethical concerns impact customers, suppliers, employees, broader stakeholders, and brand and reputations. Hence, organizational leaders must take responsibility for AI-driven ethical concerns (Davenport and Katyal 2018). The 2022 Optus security breach in Australia revealed the lack of leadership responsibility in the organizations. Governance institute of Australia found that 34% of the respondents think senior organizational leaders are responsible to deal with such situations. 50% of the respondents view that data management policy failure led to this security breach, which is the horizon of senior leadership (Tong 2022).

In the AI landscape ethical concerns are related to accountability, fairness, transparency, and safety issues. Leaders play a vital role in addressing the ethical concerns in these areas. Accountability refers to the human liability over the AI's actions and outcomes. Human judgement aids AI to assess the various effects on stakeholders. Leaders play a vital role in identifying the responsibility (Kompella 2022), answerability and auditability (Leslie 2019) in each stage of AI's design, implementation, and monitoring. AI's fairness refers to the unbiased application for concerned stakeholders. Organizational leaders safeguard AI's fairness by ensuring an equitable analytical structure, fair processes of an AI-based model, and reasonable features (Leslie 2019). Transparency deals with the 'Why' question of AI-based processes. Leaders justify the outcomes of AI-based processes by explaining how the AI-based model works. Such explanations clarify the rationales behind AI-based processes, and ultimately produce non-discriminatory, ethically permissible, and publicly trustworthy AI-based solutions (Leslie 2019). Safety is a critical dimension of AI ethics that establishes human control over AI system. AI system is safe when it delivers to the designer's expectations in the changing circumstances. Leaders must evaluate the transformative effect of AI's technical sustainability on individuals and society to produce safe and reliable solutions (Leslie 2019).

The Dynamic Managerial Capability View

Strategic management literature has sought to synthesize the insights from human psychology to understand the changing nature of competitive industry structure (Peteraf and Shanley 1997) and to clarify the nature of cognitive biases in strategic decisions (Bateman and Zeithaml 1989). During this period, organizations' outlook changes from external environment to internal capabilities (Hodgkinson and Healey 2011). Increasingly, strategy scholars are paying attention to the individual-level cognitive and behavioral processes to promote learning, organizational adoption, and performances (Helfat et al. 2007). From a micro-foundation perspective, dynamic managerial capabilities are the most effective theoretical lens in capability research (Helfat and Peteraf 2015). Micro-foundations are context-specific (Felin and Powell 2016); hence, in the emerging AI environmental context (Felin et al. 2012), a review of capabilities required for effective leadership in AI-driven organizations. Moreover, understanding dynamic managerial capabilities in AI environments allows the managers to set the priorities and determine the strategic factors for higher organizational performances (Helfat and Martin 2015). Dynamic managerial capabilities allow organizations to use their resources to neutralize threats and harness opportunities in competitive environments (Sirmon and Hitt 2009). Increasing trend of AI adoptions is creating ethical concerns (Davenport 2019), and distinctive leadership challenges for the organizations (Kompella 2022). Dynamic managerial capabilities play a vital role in responding to those challenges; specifically, to emergencies, crises, and disruptive circumstances (Ishida 2020).

RESEARCH METHODS

Interview Questions and Participants

We reviewed industry reports, magazines, newspaper articles, and scholarly databases to develop an original research question. Our search yielded the research question: “What are the dimensions of leaders’ AI-driven capabilities?” We employed semi-structured interviews to gather primary data from 20 interviewees from 14 financial service companies in Bangladesh including banks, leasing, insurance, and fintech. We used the online platform Zoom to conduct the interviews. The entire data collection period was four months. The interviews were audio-recorded and later transcribed. The interviews ranged from 32 to 62 minutes, averaging 44 minutes. Immediately after each interview, the first author took notes to reflect on the key aspects of AI-driven leadership. After the interview, interviewees were emailed for follow-up questions for further clarification. During interviews, we started with general questions, then moved toward open-ended questions, and based on the participants’ explanations, progressed to relatively specific questions. The interviewer remained flexible and open to new knowledge during the interviews. Moreover, we gathered various secondary data relevant to leaders’ AI-driven capability to complement our interview data.

Sampling and Data Collection

We adopted a theoretical sampling technique to include the participants who work in mid to top managerial levels. Theoretical sampling helped us to gather the widest possible understanding of leaders’ capabilities in the AI environment. Theoretical sampling helps to gather and constantly compare data with existing literature and emerging theoretical concepts to select subsequent participants (Nenonen et al. 2019).

Interviewees were from Bangladesh’s financial services industry. Compared to other industries, the financial services industry has witnessed widespread AI adoption (Jahan 2021). Considering the dynamism and intensity of AI adoption (Khan et al. 2021), we included participants working in executive positions in private commercial banks, leasing, insurance and fintech companies. We reached the participants through two online alumni association groups. Based on our judgement, we initially selected six participants for the interview. A snowball sampling method was employed to reach the rest of the 14 participants. Because of the nature of the work, all the participants actively work with senior management, and have experience working in AI-based projects within their respective organizations. The participants have diverse job experience ranging from 14 to 22 years (see appendix A, Figure A1). Such profiles help to gain valuable insights into leaders’ capabilities, particularly in an emerging AI-driven organizational context. After 20 interviews, we concluded the interviews because of data and theoretical saturation (Strauss and Corbin 1998). Additional interviews were not likely to generate any new knowledge on leaders’ AI-driven capability.

All the interviews were conducted in Bengali language. Back-translation is regarded as a well-known method to ensure equivalence between the translated and original versions (Behling and Law 2000). Following the back-translation method (Triandis and Brislin 1984), two independent bilingual translators translated the audio transcripts. The first translator translated the transcripts from Bengali to English, and the second translated the transcripts from English to Bengali. Next, both translated versions were compared for content equivalence.

Data Analysis

We employed open and selective coding for data analysis. To develop the first-order concepts, we used open coding by rigorously reviewing every twenty lines of the interview transcripts. At

this stage, we particularly focused on the vocabulary used by the participants. Next, we compared the first-order concepts to find the similarities and differences and categorizing them into second-order themes. Finally, we employed selective coding to classify the second-order themes into aggregate dimensions of leaders' AI-driven capability. Practically, we developed data structure to show the first-order concepts (leaders' activities), second-order themes (capabilities), and combined dimensions (capability sets). This process shows the logical flow of raw data toward aggregate dimensions.

Trustworthiness

We ensured trustworthiness standards by following the guidelines in interpretive research. We safeguard the credibility, generalizability, conformability, integrity, and generality of the research (Miles and Huberman 1994). We ensure credibility by sharing the summary of findings with the participants for their feedback. Moreover, all the researchers provided input in the data collection and analysis phases. We applied theoretical sampling to achieve data saturation that confirms theoretical generalizability. On the other hand, research findings were shared with executives from airlines and telecom companies for feedback that confirms empirical generalizability. We followed university research protocol to adhere to the integrity standards. We ensured conformability by conducting adequate interviews and asking the interviewees follow-up questions wherever necessary. To ensure generality, we kept an open mind during the interviews, and the length of interviews was sufficient to develop in-depth insights into the various aspects of leadership capabilities in AI environment.

DIMENSIONS OF AI-DRIVEN CAPABILITIES

AI-driven capability refers to the automated technologies that enhance human intelligence. AI-driven capability stimulates reasoning, and ultimately results in human-machine collaborative behavior (Sayantini 2022). AI-driven capabilities include leaders' capacity to adopt AI technologies, employ data-driven decisions, and coordinate human-machine collaboration in organizations. From a leadership perspective, AI aids to overcome cognitive limitations and make effective decisions (Jarrahi 2018). Wilson and Daugherty (2018) also support such arguments that AI can augment leaders' capability for better decision-making. However, Brynjolfsson and Mitchell (2017) contend that AI competence is effective in specific contexts, and comparatively fragile than human decision-making for many tasks. AI-based systems work on data-driven rationality. AI systems often weigh more on value creating parameters that compromise ethical standards (Wright and Schultz 2018). In this scenario, leaders' capabilities with AI capabilities will collaboratively determine the organizational success (Tsai et al. 2022). In the leadership context, three dimensions with six capabilities are vital in AI environment. The following sections discuss these dimensions of AI-driven capability with relevant capabilities under each dimension (see appendix B, Figure A1) based on the evidence from the financial services industry.

Technical Capability

Leaders' technical capability refers to the resources and infrastructure required for leaders to successfully lead in AI environment (Davenport and Mittal 2023; Davenport and Bean 2021; Davenport and Foutty 2021; Kolbjørnsrud et al. 2017; Watson et al. 2021). Leaders encounter greater challenges in the absence of technical capabilities. Davenport and Mittal (2023) find the heads of AI and analytics in most of the organizations spend significant time to highlight the value and purpose of AI technology to other managers (Davenport and Mittal 2023). They focus

on educating decision-makers from all organizational units regarding the appropriateness of AI functions, and AI-based processes. Apart from upskilling and re-skilling the workforce, specifically, organizations must acknowledge that all employees require AI-based training. The following table shows 12 technical activities clustered into 2 technical capabilities from our interview findings.

Table 1: Data analysis process: Learning capabilities theme

1st order concepts: Leaders' activities	2nd order themes: Leaders' capabilities	Aggregate dimension
• Equip themselves with AI technologies • Intend to invest more in emerging AI technologies • Use AI technologies in various situations • Acquire new AI technology-based skills • Possess knowledge on AI technologies • Remain updated on emerging AI technologies	Technological Capability	Technical Capability
• Use AI based information in various situations • Access to AI based information processes • Always encourage to use AI based information • Possess cutting-edge training on AI based information processes • Adopt AI based information as a part of Organization's AI effort • Learn new skills to use AI based information	Informational Capability	

Technological Capability

Leaders' capacity to use AI technologies is evidenced as key technical capability in AI environment. Such technical capabilities aid leaders to enhance credibility and to adapt to changing circumstances (Hysong 2008). In AI environment, technological soundness empowers leaders' cognitive capabilities (Akter et al. 2021). Leaders' technological soundness persuade middle and front-line managers to learn new technological skills, establish data-driven decision-making culture, and drive for innovations in the organization (Davenport and Mittal 2023). Leaders' attitude toward AI-based technologies, the extent they equipped with those technologies, and relative efficiency to use the technologies are the key elements of technological capabilities (Motamarri et al. 2020).

Most interviewees said that leaders from different organizational levels use AI-based technologies to various extents. Due to competitive and regulatory pressure, banking organizations are becoming increasingly automated. Leaders in those respective organizations must use AI-based technologies for internal operations and external regulatory purposes. For internal business operations, the organizations have their 'core banking software' which is updated occasionally with increasing automated features. All the operational leaders from their positions are required to use such technologies for internal operations and communication purposes. Due to the Bangladeshi

government's extended digitalization efforts over the last decade, most government entities have adopted many automated software and online platforms in their operations. Leaders from different levels of organization need to report and coordinate with such external entities, which require them to be capable of using technologies at an adequate level. For example, organizations need to report to the Central Bank, coordinate with the Revenue Board, the Land Management Office (for mortgage purposes), collaborate with law enforcing agencies etc. ID2, who works with the IT division with leadership capacity in a private commercial bank reflected on technological aspects.

We acknowledge the need to use AI-based technologies and equip ourselves with sophisticated technological tools. Moreover, top management is increasingly paying interest to invest in AI-based technology infrastructure for strategic purposes. we feel that the capacity of emerging leaders to use such AI-based technologies is and will remain central to the all-out effort to digitally transform the respective organization better than others in the highly competitive financial services industry (ID 2).

AI-based knowledge is a key determinant of leaders' technological capability in AI environment. Adequate knowledge helps to successfully apply AI-based processes and assess the outcomes (Akter et al. 2021). AI-related knowledge also equips leaders to serve customers better in AI environment (Motamarri et al. 2020). Most of the interviewees possess knowledge and skills in terms of AI. They also mentioned that some of the Board of Directors (BoD) possess sophisticated AI-related knowledge and keep updates on automated technologies worldwide. However, such knowledge among the executive leaders is significantly higher than that of BoD members. ID18, who works for a large private commercial bank, has active experience of working with AI-based projects in the organization. He has experience of dealing with both BoD and other operational leaders in AI-based projects.

We, as operational leaders, are required to actively engage and solve many of the routine and unique problems in the work environment. Updated AI-based knowledge enables us to re-think the work-related issues in relatively easy and cost-effective ways. Moreover, strong knowledge is essential to pursue BoD for approval of AI-based proposals. In addition, we consider AI-related knowledge as leverage to their current job security and future job opportunity & competitiveness (ID 18).

Most interviewees said that financial services are getting increasingly digitalized. In an increasingly digitalized environment, AI-based knowledge is not only an essential skill, but also a critical parameter of an organization's strategic success.

Informational Capability

AI-based systems and processes generate sufficient information that benefit organization. Leaders' capability to access and use AI-based information systems and processes significantly determines the success of AI-driven organizations (Akter et al. 2021). Such capability includes leaders' capacity to access AI-based analytics, and updates on AI-based systems and processes (Motamarri et al. 2020). In complex circumstances, AI extends leaders' knowledge (Doornenbal et al. 2022). The interviewees said that increasing use of AI-based technologies has opened avenues to generate ample information in many aspects of the organization. Some interviewees like ID14 who works as an Assistant Vice president for a private commercial bank were more interested in accessing and relying on automated technology-based information.

We feel that access to such information creates the opportunity to decide based on a wide range of data in a relatively unbiased and objective way. Moreover, access to AI-based processes enables us to remain updated on real time situations in various

circumstances. To develop emerging leaders, organizations should create scope to use AI-based information in various situations (ID 14).

Because of the nature of business, leaders also simultaneously hold a restrictive view to giving access to AI-driven information to all levels of employees. Only the strategic level leaders can access all the AI-based information and processes. The rest of the leaders only have access to AI-based information to the extent they require within their job responsibilities. Otherwise, open access to AI-based information may jeopardize the safety and security stakes of the concerned stakeholders. A well-crafted policy to access the AI-based process and use the AI-based information reduces the risks of safety and security concerns of stakeholders.

Training plays a vital role in accessing and using AI-related information in various circumstances. Regularly exposing to various trainings develop leaders' analytical capacity to deliver better in AI-driven organizational environment (Motamarri et al. 2020). Interviewees view that relevant training on various AI-based information systems and processes aid organizational leaders to craft effective strategies in AI-driven financial services industry. Most of the interviewees said that they often participate in AI technology related training, workshops, seminars etc. at home and abroad. Most of the organizations have their training institute. The IT division, in collaboration with the training institute, arranges a series of routine technology-related for the employees. Sometimes, unit heads are provided with routine technology-related training and assigned responsibility for training their own units. ID1, who works in the human resources department of a private commercial bank reflected on this perspective.

To equip us with cutting-edge AI technology-based skills, organization undertakes development programs. Senior leaders guide the IT division to design the development programs. To conduct the development programs, frequently external experts are hired. These programs aim to develop emerging leaders. Among the participants, who show higher potential are frequently sent to the development programs at national and international levels (ID1).

Adaptive Capability

Leaders' capacity to grasp and articulate the effects of AI-based actions is referred as the leaders' adaptive capability. Adaptive capabilities help leaders to correctly assess situations and choose paths to reach targeted outcomes. Adaptive capabilities also assist leaders in developing and implementing effective production, marketing, and human resource policies for the organization (Campbell 2021). In an AI-driven organizational environment, we find decision-making and integration are two key adaptive capabilities. Based on our interview findings, the following table shows 14 adaptive activities clustered into 2 adaptive capabilities.

Table 2: Data analysis process: Adaptive capabilities theme

1st order concepts: Leaders' activities	2nd order themes: Leaders' capabilities	Aggregate dimension
• Use AI to solve existing organizational problems • Rely data over experiences to make various decisions • Stress on using AI creatively to decide on unique organizational issues • Estimate the impact AI on individual and organizational productivity	Decision-making Capability	

• Evaluate the role of AI in making relatively quicker decisions • Evaluate the impact of AI adoptions on jobs and employment scope • Consider the overall organizational strategy to adopt AI technologies		Adaptive Capability
• Openly discuss the difficulties of AI adoptions in the organization • Arrange cross-functional meetings on AI implementation issues • Ensure involvement of functional leaders to the AI adoption processes • Properly assign responsibilities during AI adoption processes • Appraise AI-based proposals with adequate time and efforts • Understand the performance criteria of AI-based systems • Monitor the performances of various AI-based systems	Integration capability	

Decision-making Capability

Decision-making is considered as a leaders' significant adaptive capability. Now businesses make more decisions in the various areas than ever before (Kim et al. 2012). A study of Harvard Kennedy School shows that by 2018, 34% of total jobs require core decision-making in areas like analyzing, prioritizing, and strategizing. AI helps to increase the volume of decision-making in the organization. Often, decision-making in organizations is related to problem-solving. In AI environment, leaders use analytics insights to decide and solve problems in various situations (Akter et al. 2021). Problem-solving is related to the leaders' capacity to fix problems, tendency of using data over experience, and exerting creativity to the problem-solving processes (Motamarri et al. 2020).

Most of the interviewees said that over the last few years, leaders have increasingly relied on automated technologies to solve any problems that appear in the work setting. However, many unique problems are difficult to resolve through using AI technologies. Operational leaders focus on the dimensions of those problems and think about how the solutions can be translated into automated technologies. ID5, who leads the customer relationship management team in a private commercial bank explained the use of AI-based technologies to solve problems in the organization.

We focus on data-driven insights over hunches to solve any problems. We feel that data-based decision making is more scientific and predictable that can be replicated in similar circumstances. It saves time and cost in the long term with greater comfort in operations. A focus on creating an AI-driven environment will direct the employees' thought process toward tech-driven solutions to emerging problems (ID 5).

AI is effective in increasing efficiency and improving accuracy in decision-making (Agarwal et al. 2022). But improved accuracy and increased efficiency are not sufficient, because decision-making in one area impacts the other areas of organization. While designing AI based decision-making system, organizational leaders must re-visit the integrated paradigm of value chain

(Agarwal et al. 2022). In the collaborative human-AI decision-making process, Raisch and Fomina (2022) find probabilistic decision-making is more productive than deterministic decision making. There are three archetypes of leaders' decision-making: skeptic, interactor, and delegator. Following the 'interactor' archetype, leaders can effectively decide and solve problems in AI environment (Meissner and Keding 2017). Decision-making capabilities include leaders' capacity to evaluate the impact on jobs, cost, productivity, and timeliness while adopting AI in the organizations (Wamba et al. 2017).

Most of the interviewees said that it is important to consider both short- and long-term benefits of adopting AI-based technologies against the cost of adoptions. To decide whether to adopt AI-based technologies in various circumstances, primarily they focus on strategic interest. In the short term, they focus on the benefits in terms of saving time and increasing efficiency. ID17, who is a corporate branch manager of a large commercial bank reflected on decision-making.

In the long run, we assess whether automated technologies will conflict with the overall strategic directions of the organization. Like some financial organizations have a strategy to expand toward more rural areas which restrict over-emphasize on automated technologies as it will create a direct negative impact on prospective client base (rural clients are comparatively less tech-savvy). On the other hand, some organizations are also expanding to the rural areas, but through the agent banking networks which give them higher liberty to use automated technologies to connect their agents (ID17).

Most interviewees also mentioned that the duration of AI-based project implementation and consequence of such project implementation difficulties on the routine work of employees are two key considerations to decide on AI adoptions. They also consider the impact of automated technology applications on the employment risks of the current workforce.

Integration Capability

Integration capability, which is dynamic in nature (Teece et al. 1997) conceptualizes how leaders coordinate and control AI initiatives in the organization. Coordination involves how leaders settle AI issues in cross-functional meetings and share AI-related knowledge within the organization. On the other hand, controlling focuses on leaders' idea about AI performance criteria, AI-based business processes and methods, and AI responsibility within the organization. Such capability emanates from how leaders evaluate AI-based proposals and use detailed information on AI-based methods and processes (Wamba et al. 2017). Most of the interviewees emphasized integration difficulties of AI-driven changes in the organization. They stress arranging a series of cross functional meetings to discuss the coordination issues. Like ID11, an experienced leader who works for a large private commercial bank, mentioned the unique aspects of integration difficulties.

If a coordination plan is not clearly crafted and guided with combined efforts before AI-based technology implementation, it ultimately incurs undue cost and time. When any project is undertaken to adopt AI-based technologies in the organization, it is important to assign responsibilities to the employees from various hierarchical positions with expected performance standards (ID 11).

Most of the interviewees emphasized continuously monitoring the progress of the AI-based projects and providing guidance from time to time. Moreover, integration efforts are not only important for AI applications but also to the changes in associated business models. Interviewees mentioned that if AI adoption is not properly aligned with effective business models, organizational objectives remain unfulfilled.

Transformational Capability

The concept of transformational capability is widely used in sociology, politics, and organizational behavior. Leaders' transformational capability translates employee performances beyond expectations (Khan et al. 2020). In AI environment, leaders' transformational capabilities focus on bringing organization-wide AI-based changes (Davenport and Bean 2021; Davenport and Foutty 2021; Watson et al. 2021). Systematic AI applications in various functions of the organization enhance data-driven decision-making and new business processes (Davenport and Mittal 2023). Likewise, AI must promote products, service offerings, and new business models. Based on our interviews, we find 10 transformational activities clustered into 2 transformational capabilities presented in the following table.

Table 3: Data analysis process: Transformational capabilities theme

1st order concepts: Leaders' activities	2nd order themes: Leaders' capabilities	Aggregate dimension
• Communicate the long-term fate of AI initiatives with employees • Represent the short-term result of AI initiatives to the employees • Transmit a message on the urgency of AI based changes • Stress on resolving old organizational issues in AI-driven ways • Encourage employees to come up with AI-based business models • Challenge old assumption of works based on using AI technologies	Sense-making capability	Transformational capability
• Consider the uncertainty of AI-based changes on work environment • understands the severity of AI effects on work units • Consider the uncertainty of AI-based changes on supply chain • Try to handle the uncertainties by using AI-based technologies	Uncertainty-dealing capability	

Sense-Making Capability

Sustainable AI-driven transformations depend on effectively developing a sense of AI initiatives in the organization. Sense-making is a critical transformational leadership capability (Lugtu, 2020). In an AI-driven organizational context, sense-making includes leaders' capability to grasp AI initiatives' near and distant future (Rafferty and Griffin 2004). The interviewees have diverse views in terms of short- and long-term objectives of AI-based technology adoptions. The tech-savvy leaders always convey a message through various seminars, symposiums, workshops etc. that the organization is heading toward digital transformation in the long run. They also try to keep the confidence of employees through assuring them that their job wouldn't be jeopardized even at a level of advanced automation. They encourage employees to develop skills in the same direction. On the other hand, operational leaders view differently in terms of sense-making. ID12, who has

a decade of experience as a leader with a private commercial bank mentioned the short-term aspects of AI adoptions.

We are more interested in guiding employees in the short run. We always focus on continuous learning, and guide employees to learn new technologies. We constantly communicate employees regarding the possible changes of AI-based technologies in the short run. As AI-based technologies rapidly change, understanding short-run implications is critical to the employees (ID 12).

Often, organizations offer new business models associated with AI-based changes. Lugtu (2020) refers rethinking old organizational issues in novel ways leads to model innovation. The new model stems from how leaders re-think old organizational issues, question the existing organizational practices, and challenges the underlying assumption of such practices (Rafferty and Griffin 2004). Most of the interviewees mentioned that how senior leaders initiate new business models is critical to making sense of AI-based technology implementation. Although AI-based projects do not always require a business model. Still, adoption of automated technologies impacts the existing target markets through giving the same services in better ways. Sometimes, adoption of such technologies primarily focusses on distinct client bases (internet banking, apps etc. focus on professionally elite groups of clients). ID11, who has extensive experience, and works in the top management in a private commercial bank reflected on the relevance of new models.

We want to re- think of the old organizational issues in automated technology-based ways. We focus on the assumptions of organizational existing working mechanisms. Because, if changes in the assumptions are possible by using AI-based technologies, the outcomes would be more fundamental and sustainable. This will significantly impact the organization's competitive edge (ID11).

Uncertainty-Dealing Capability

Teece et al. (2016) introduce uncertainty-dealing capability as a transformational leadership dimension. In an increasingly AI environment, presuming the unpredictability of AI-based changes on different work units, understanding the consequential severity of AI-driven changes, and relying on AI-based technologies to address those consequences are the key elements of leaders' uncertainty-dealing capability (Matsunaga 2022). Most of the interviewees said that it is important to recognize both the internal and external uncertainties arising out of automated technology application. Like whether employees will be able to adopt such technologies, whether these will impact work teams positively, whether such applications will bring any unprecedented disruptions in the internal working environment. In terms of external implications, leaders are more concerned with the uncertainty regarding whether the AI-aligned business model will work properly, and whether the existing client base will be misguided due to the automated technology applications. ID15, who is a highly experienced top-level leader working for a leasing company, illuminated the AI-driven uncertainty aspects at workplace.

So, as a part of top management, we need to project the uncertainties while adopting AI technologies in the organization. Moreover, we must assume that uncertainties are normal when adopting such evolving technologies. It is more important to stay confident and be ready to handle any uncertainties by creatively using AI-based technologies (ID15).

Most of the interviewees mentioned that tech-savvy top leaders are more confident and feel capable of dealing with uncertainties. The rest of the leaders rely on the pro-activeness of the IT division to properly assess the consequences of AI-based technology adoptions.

DISCUSSION

Theoretical Contributions

This research provides a novel perspective of leadership capabilities to behave more responsibly in an AI-driven organizational environment. In the AI environment, contemporary capability research is conceptualized from a service analytics perspective (Akter et al. 2021; Mottamari et al. 2020; Wamba et al. 2017). The findings of this research show that leaders must re-think their capabilities to lead the AI-driven organizations more responsibly. To augment the AI capability, leaders will require human intelligence capabilities like AI-based knowledge, creativity, and judgement. Collaborative human-machine capabilities will determine the strategic directions for competitive organizations (Davenport 2016). The combination of human-machine capability creates dynamic capability in AI environments. Because individual level dynamic capabilities are required to anticipate and interpret the disruptive changes in the external environment (Helfat and Peteraf 2015).

We also advance the current stream of AI-driven leadership research (Davenport and Bean 2021; Watson et al. 2021) by offering AI-driven capability from a DMC view in two ways. First, we explore the dimensions of AI-driven capability based on the rigorous insights from the interview outcomes. Second, we contend that AI-driven capability enables leaders to address the ethical challenges emerge in AI-driven environments. Previous DMC research focused on uncertain and crisis situations (Parker and Ameen 2018). Our research supports such notion by uncovering AI-driven capabilities as DMC for responsible leadership. To ensure responsible AI adoption, leaders' AI-driven capabilities are significant in mitigating organizational risks. Responsible AI plays a vital role within the organizational business process to equitably accommodate all the relevant stakeholders (Kompella 2022; Marr 2020).

Practical Implications

Our research findings practically contribute the increasingly AI-driven organizations in two ways. First, we explore six AI-driven capabilities under three dimensions. Increasingly AI-driven organizations may consider developing those capabilities among the emerging leaders by structured training and development programs. The respective organizations will also be able to identify the more promising leaders suitable in AI environments. Building digital capabilities among the workforces will benefit the organizations in competitive environments (Yokoi et al. 2023). Second, AI adoptions pose ethical risks for the organizations and create new leadership challenges. We argue that leaders' AI-driven capabilities play a vital role in addressing those challenges. Hence, developing leaders' AI-driven capabilities will eventually equip them with the knowledge of AI ethics. Ethics programs in the organizations should start from the executives, then should to the ranks, and finally translated into AI technologies. If leaders possess knowledge on AI ethics, translating the ethical considerations will become effective and sustainable. Leaders' ethical awareness mitigates the transparency and discrimination of AI algorithms, better customer privacy and service personalization (Yokoi et al. 2023). Ultimately, AI ethics helps organizations to adopt value-driven technologies, enact better policy structure and set exemplary corporate standards (Yao et al. 2018).

Limitations and Future Research Directions

Our interview findings provide novel and significant research directions to AI-driven leadership. However, inherent to interview-based studies, our research also has several limitations. First, the scope of our research is limited to the financial services industry, and other contexts may explore

distinct dimensions of capability. Future research may investigate the other contexts to build a general understanding of leaders' AI-driven capability. Second, to explore the dimensions of AI-driven capability, we don't consider the diverse contextual factors such as level of AI adoptions or firm size. Future research may empirically consider the firm-specific factors to overcome such limitations. Third, we explore the three dimensions of leaders' AI-driven capability. Multiple cross-sectional and longitudinal studies may investigate our research findings empirically. Cross-sectional studies will help to understand the contextual factors while longitudinal studies will aid to rigorously comprehend the AI-driven capability as dynamic capability. Finally, we extend the DMC discourse within a complex AI-driven organization system. We synthesize the extant literature with our interview findings on leaders' AI-driven capabilities. Future DMC research may focus on other crucial perspectives of AI-driven organizations to advance the debate.

CONCLUSION

The extant management literature acknowledges the critical role of AI research in leadership. AI research has always been considered eclectic in management. However, AI influences the current leadership paradigm that requires new conceptualizations to advance the theories in emerging management streams of knowledge. Combining AI and human capabilities, we explore the dimensions of collaborating intelligence in leadership, grounded in leadership theories in management research, and current and future AI applications. Leaders must fundamentally re-think the way humans and machines interact with each other at work (Davenport and Mittal 2023). Our findings present the pathways for leaders to combine the relative AI and human capabilities, and the way such collaborative use of AI encapsulates contributions for greater stakeholders.

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APPENDIX A

Figure A1: Participants' Profile

Participant ID	Organization ID	Participant's Job Title	Job Experience	Participant's Education	Type of Organization	Organization Size (Number of Employees)
1	A	Vice President	18 Years	MBA	Banking	2200
2	B	Assistant Vice President	14 Years	MBA	Banking	3500
3	C	Senior Manager	16 Years	B.Com	Insurance	2000
4	A	Vice President	17 Years	MBA	Banking	2200
5	D	Assistant Vice President	14 Years	MBA	Banking	1800
6	E	Branch Manager	14 Years	MBA	Banking	2300
7	F	Assistant Vice President	14 Years	MBA	Banking	2000
8	G	Senior Assistant Vice President	16 Years	MBA	Banking	2500
9	H	Division Head	14 Years	MBA	Housing Finance	1500
10	I	Assistant Vice President	14 Years	MBA	Banking	3000
11	J	Senior Vice President	20 Years	MBA	Banking	2500
12	K	Assistant Vice President	15 Years	MBA	Banking	1800
13	B	Vice President	15 Years	MBA	Banking	3500
14	L	Assistant Vice President	14 Years	MBA	Banking	2000
15	K	Executive Vice President	20 Years	MBA	Leasing	800
16	D	Vice President	17 Years	MBA	Banking	1800
17	M	Branch Manager	15 Years	MBA	Banking	2000
18	J	First Assistant Vice President	14 Years	MBA	Banking	2500
19	N	Senior Vice President	16 Years	M.Com	Fin-Tech	1200
20	M	Assistant Vice President	16 Years	BBA	Banking	2000

APPENDIX B

Figure A1: Integrated Capability Framework

