

Yeni Gözde Yapay Zekâ: Yapay Zekânın İş Dünyasına Etkileri

AI is the New Black: Effects of Artificial Intelligence on Business World

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Özet

Yapay zekâ son dönemlerde akademik ve sosyal çevrelerde popüler bir konudur ve etkileri de iş dünyasında yankılanmaktadır. Yapay zekâ teknolojisi üstel bir hızla gelişmektedir ve bu durum faydaları ve zorlukları beraberinde getirmektedir. "Yapay zekâ" terimi iş dünyasını heyecanlandırmaktadır, çünkü hayati öneme sahip bir rekabet aracıdır, 'yeni gözde' yapay zekâdır. Bunun yanı sıra, iş dünyası yapay zekâ konusunda tedbirlidir, çünkü yapay zekâ yeni zorlukları da ortaya çıkarmaktadır. Bu araştırmanın amacı, iş dünyasında yapay zekâ ediniminin genel durumunu incelemektir. Bu amaçla, önde gelen araştırma kuruluşları tarafından yayınlanan 14 araştırma raporu örneklem olarak belirlenmiştir ve keşfedici bir desen izlenerek veriye nitel içerik analizi uygulanmıştır. Sonuç olarak; dört ana kategori ortaya çıkmıştır: 1) Mevcut durum: Yapay zekânın mevcut durumu, 2) 'Gelecek zaman': yapay zekânın geleceğe etkileri, 3) 'Zorluklar' dönüşüm sürecinde iş dünyasında karşılaşılan engeller ve endişeler, 4) 'Yapılması gerekenler': işletmelerin yapması gereken eylemler. Bu araştırmanın bulguları, dünya genelinde yürütülen araştırma raporlarını esas alarak genel bir bakış açısı sunmaktadır ve işletmelerin mevcut durumunu, yapay zekânın potansiyel etkilerini, iş dünyasında karşılaşılan engelleri, endişeleri ve bir 'yapılması gerekenler' listesi içermektedir.

Anahtar kelimeler: Yapay zekâ, teknolojik değişim, nitel içerik analizi

Abstract

Artificial Intelligence (AI) has recently become a popular issue in both social and academic environments and its effects also resound in the business world. The AI technology is developing at an exponential speed, and this situation brings out both benefits and challenges. The term "artificial intelligence" excites the business community, because it is a vital competitive tool. In addition, the business community is cautious about artificial intelligence, as artificial intelligence also poses new challenges. The purpose of this research is to examine the general outlook of AI adoption in the business world. For this purpose, 14 research reports, conducted by prominent institutes on 'AI and businesses', were defined as sample, and qualitative content analysis was applied to the data by following an exploratory research design. As a result, four main categories emerged: 1) 'At present' represents current impact of AI 2) 'Time forward' represents future impact of AI, 3) 'Challenges' represent obstacles and concerns business world confront in transformation process, and 4) 'Must do's' represents actions that businesses should take. Findings of this research provide a general outlook and includes current situation of organizations, potential impacts of AI, obstacles and concerns for business world, and a "to do list" that will provide guidance for practitioners, based on the research reports findings conducted worldwide.

Keywords: Artificial intelligence, technological change, qualitative content analysis

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Introduction

AI is a popular issue in social and academic environments. The reason for this popularity is that we - humanity- are experiencing the influence of a new age that is called “The Second Machine Age”, “The Cognitive Age” or “The Fourth Industry Revolution”.

With the increase in data processing power of computers, technologies get cheaper and become faster, and fewer employees are required in organizations. These factors are the facilitators of AI revolution. Exponential growth of technology and digitalization are the main factors that shape the second machine age (Brynjolfsson and McAfee, 2014).

As AI technology progress exponentially, its impact in business world commenced to be perceived. Business world is familiar to facilitator role of AI applications. Hybrid systems, intelligent-agent-systems, computer-based-systems have also been utilized in strategy development, planning, and management processes. However, in business AI will not limited to the facilitator role, moreover we are at the edge of a new era that human and machine intelligence will work together by integrating each other’s superior competencies. That means a new organization culture, structure, and management style, and whoever manages the process appropriately and adapts to AI will gain competitive advantage. So, ‘AI is the new black.’ But are organizations ready for this transformation process?

The Purpose and Importance of Research

In the literature review process, it was realized that research institutes are far more ahead in examining the issue than the academic papers. Hence, this research was conducted in order to fill the gap in the literature, and to examine the general outlook of AI adoption in the business world. For this purpose, 14 research reports of prominent research institutes were defined as a sample and an inductive qualitative content analysis was applied to the data. In the following sections, the background of AI and AI in business will be examined, and then the methodology of the research will be introduced. Finally, the findings and discussion parts will be presented.

Artificial Intelligence

Humanity has been struggling to produce artificial intelligence (AI) -an artifact that entirely performs human abilities entirely. According to McCorduck (2004), the desire of representing a “living being” in a “non-living” artifact as in portraits, sculptures, drawings, and even in today’s model tools is to glorify humankind, and for Abbas (2006) the underlying issue of this desire is about being immortal.

The interaction between AI and human have been a popular issue also in science-fiction literature and provided new insights to researchers. The term “robot” was first used in a play entitled *R.U.R.* written by Karel Čapek (2013) in 1921. Philip K.Dick, Isaak Asimov and William Gibson are prominent authors in science-fiction literature on human-machine interaction. Also Marry Shelley’s *Frankenstein* provided a different standpoint in 1818 in terms of a scientist creating a biological monster, and its adverse outcomes (Geraci, 2007).

Roots of AI is generally related to ancient Greek, especially to human-server figures in Homer’s *Iliad*,(see. McCorduck, Minsky, Selfridge, and Simon 1977, p. 951) and to a dialogue between Socrates and Euthyphro on “characteristic of piety which makes all actions pious” (Dreyfus, 1972, p. xv). Socrates’ demand is a “standard” for judging human behavior. This “standard” is associated with the term “effective procedure” in computer science; “a set of rules which tells us, from moment to moment, precisely how to behave” (Dreyfus, 1972, p. xv). This ancient dream had to wait until achieving to formulate human thought. Leibniz, Boole and Frege have a significant role in this invention that in 17th Century Leibniz constructed a calculating machine, and this machine shed light on the idea “a machine that makes thought work instead of human” (Say, 2018). Boole achieved to formulate logic and developed propositional logic “a very important clue about the mechanization of reasoning” (Nillson, 2010, p. 32) but this logical system had some shortcomings, and towards the end of 19th century,

Friedrich Ludwig Gottlob Frege invented “a system in which propositions, along with their internal components, could be written down in a kind of graphical form. He called his language Begriffsschrift, which can be translated as concept writing” This system was antecedent of “predicate calculus”, an important system in AI, and also “semantic networks”. (Nilsson, 2010, p. 33). And Alan Turing is a significant figure in AI history, as in his article *Computing Machinery and Intelligence*, Turing (1950) provided a different point of view to the concept of “thinking machine”. It was the first modern article that handled the issue of mechanizing human intelligence entirely. He asserted that the question “Can a machine think?” is an ambiguous question and the issue of “intelligent machine” can be solved by Turing Test. The test is an imitation game and considers intelligent behavior the ability to perform human-level intelligence in all cognitive tasks, and a machine that is able to pass the test can be considered as “intelligent” (Russel and Norvig, 1995).

In the following years after Turing’s (1950) groundbreaking article, AI was founded as a discipline in 1956 at Dartmouth Conference. In project proposal, McCarthy, Minsky, Rochester and Shannon (1955, p. 1) defined the conjecture of AI as “... The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it...” The founding purpose of AI was to simulate human intelligence in all aspects, but this aim has not achieved until this time, and AI research improved through different approaches in terms of purpose and scope. Zambak (2014) handled these approaches under four titles: The technological approach, the imitation approach, the intermediary approach, and the expert-system approach. The distinguishing features of four approaches are presented in Table 1.

Table 1. The AI Approaches

AI Approaches	Definitions
The technological approach	“AI is the name of a single and specific technical (machine) project that aims to produce a specific product.”
The imitation approach	“...a machine can be made to simulate human intelligence and duplicate psychological phenomena. In these definitions, the notions of simulation and duplication are based on the assumption that every aspect of cognitive processes, skills and other features of the human mind can in principle be precisely comprehended.”
The intermediary approach	“...in the intermediary approach, the aim of AI is to understand human intelligence/thinking by using computer (machine) techniques (models); AI is therefore a methodological tool for the very general investigation of the nature of the human mind.”
The expert-system approach	“In AI, the early 1970s was the period of awakening from a sweet dream. After disappointments in certain projects and harsh criticisms against AI, the tasks in AI were changed. After the 1970s, the general themes were knowledge-based systems, expert systems and connectionist networks. These shifts in tasks and themes within computer science led to a new understanding of AI.”

Source: Table 1 is extracted from Zambak (2014, pp .67-68)

Zambak (2014) also emphasized that although there are differences between the approaches, there are also common parts, and reformulated basic and common features as:

- AI is a machine performance that can be ascribed to ‘intelligence’ and ‘mental states’.
- AI is interested in human intelligence, behavior and mental states as a pattern or form in a functional way.
- AI is a useful tool for explaining certain qualities of human cognitive abilities.
- AI aims to imitate the essential faculties and powers of human intelligence.

Consequently, AI discipline was founded to construct an intelligent machine that simulates all cognitive tasks of human intelligence that is called “Artificial General Intelligence (AGI)” but through time this aim has not achieved, but significant developments were carried out. *DeepBlue*, a chess program developed by IBM, defeated world chess champion Garry Kasparov after a six-series match in 1997. But the most striking event was when *AlphaGo*, developed by *Google DeepMind* defeated at first,

European Go Champion in 2015 and then World Go Champion in 2016 The key point is that Go is an ancient Chinese game, requires wisdom and intuition (Silver and Hassabis, 2016).

In today's world, AI systems that facilitate human-work, and specialized in one or more but not all areas are called as "narrow AI" (eg. AlphaGo). In modern organizations, AI performs tasks through machine learning, automatic reasoning, knowledge pool, image recognition, and natural language processing processes (Von Grogh, 2018).

Artificial Intelligence in Organizations

By 1970s business, Management information systems (MIS), and the finance community realized the potential benefits of intelligent hardware and software. Natural language processing interfaces, expert systems, decision support systems were examples of commonly utilized applications in business. (Reitman, 1984). Reitman (1984, p. 6) listed "why business interested in AI?" as:

- "Programming experts"
- "Automating limited language interactions: The Schulemberger example"
- "Automating manufacturing and assembly",
- "Providing better database access and control: DEC's programs"
- "Augmenting decision support: scenario generation"
- "Robotics: Beyond the paint-and-weild robot."

The date that points out Business world accepted AI as a tool promising commercial gain is August 1984 that National Artificial Intelligence Conference was organized, contrary to previous ones in this conference 75 % of participants were from business world and industry environments. The most striking fact was that giant companies were also attended, and six of them were "billion dollars and above" level companies operating in computer sector. This fact shows that hundreds of brilliant sector leaders considered AI as a commercial reality (Rhines, 1985).

In today's business world organizations utilize AI as a tool to save time and workforce, facilitate human-work, and exploit AI's features that exceed human ability (eg. processing big data). Battaller and Harris (2016) categorized AI technologies as presented in Table 2 and suggested business solutions that will provide business value.

Table 2. AI Technologies and Business Solutions

Technology	Definition	Example Solutions
<i>Sense</i>		
Computer vision	Acquiring, processing, analyzing and understanding images	Video analytics integrated with surveillance cameras provides situational awareness of business operations, delivering insights about risk, safety and security. In retail, video analytics can be used to gain insights into shopper behaviors effectively and systematically.
Audio processing	Identifying, recognizing and analyzing sounds and speech	Speech recognition technologies integrated into call centers automate the identification of callers.
Sensor processing	Processing and analyzing information from sensors other than cameras and microphones	In an agricultural setting, sensors in the field can be integrated with software to deliver "precision agriculture"— sensing and communicating status about temperature, humidity, etc., enabling more precise care for crops.
<i>Comprehend</i>		
Natural language processing	Understanding and generating language in spoken and/or written form	Personal assistants on consumer smart phones provide guidance and services using natural language. Increasingly, search capabilities include the ability to understand the meaning of what a person is saying, not just recognizing key words or doing statistical retrieval.
Knowledge representation	Depicting and communicating knowledge to facilitate inference and decision making	Knowledge-based tools provide the capability to link a particular search or piece of content to other relevant content on the web. This is done by tagging all content and then mapping it to a larger representation of knowledge. For example, a search for "Da Vinci"

		will link one to particular paintings and creations, as well as to Italy, to the Renaissance, and so forth.
Act		
Inference engines	Deriving answers from a static knowledge base such as business rules	Solutions can apply rules to make automated loan approval or credit decisions, or granting of visas. Such capabilities can deliver accurate decisions in a fraction of the time of manual decision making.
Expert systems	Emulating the decision-making ability of a human expert and solving complex problems by reasoning with the information available in its knowledge base	Medical diagnostics as well as legal research can be significantly aided by the ability of expert systems to sift through millions of data sources, synthesize information and present it to a user.
Machine learning	Altering the decision process based on experience	Software tools and personal agents can learn from users to improve productivity—for example, by sorting email, then extracting calendar entries and action items.

Source: Battaller and Harris (2016, p. 5)

As presented in Table 2, AI technologies can sense, comprehend, and act. They perceive the world and collect data, analyzes the collected data and understand, make decisions based on information, and leads the way basing on these analyses, learn from experience, and alter its processing basing on experience (Battaller and Harris, 2016). AI is especially utilized in information management process for providing decision-making support (Metaxiotis et al., 2003).

A great number of studies in business research examine AI as a tool in organizations; in general, on the application of artificial neural networks as a prediction tool (Fletcher and Gross, 1993; Li, 1994; Kaastra and Boyd,1996; Ahn, Cho and Kim, 2000. Kim and Han, 2000, Huang et al., 2004; Sharma and Chopra,2013). Besides, a branch of research on AI in business were on applications of intelligent hybrid systems, intelligent-agent-systems, and computer-based-systems in strategy development, planning, and management processes (Jennings, 1996; Li et. al., 1999; Shen and Morrie, 1999; Li, 2000; Li et al., 2002; Martínez-López and Casillas, 2013). Besides, researchers commenced to handle the issue from the aspect of human, technology based-systems, and AI collaboration (Dabholgar and Bagozzi, 2002; Schrempf et. al. 2005; Yadav and Pavlou; 2014; Bosch and Bronkhorst, 2018; Huang and Rust, 2018).

In the recent time, as progress of AI accelerated on the methods of machine learning, deep learning, and big data processing etc. it was realized that more researches on AI in business world needed. Research institutes and research reports they published are ahead of the academic literature in this regard. These researches examined the business world from the point of ‘impact of AI’ in many aspects. For this purpose; in this research, research reports published by research institutes were selected as sample in order to provide a general outlook on the issue “AI in organizations”, as the finding of the reports on different samples around the world gathered and analyzed by qualitative content analysis in this research. Thereby, findings of research will contribute to academic literature in this aspect. For this purpose, the following research question was answered in this research:

RQ: What is the general outlook of AI adoption in business world?

The research question was not detailed with sub-questions for an explorative design was followed, and it was allowed categories emerged during analysis.

Methodology

A qualitative content analysis methodology was followed in analyzing data. Content analysis is “the intellectual process of categorizing qualitative textual data into clusters of similar entities, or conceptual categories, to identify consistent patterns and relationships between variables or themes” (Given, 2000, p. 120). The objective of qualitative content analysis is “systematically transform a large amount text into a highly organized and concise summary of key results” (Erlingsson and Brysiewicz, 2017, p. 94).

Content analysis is a “method that is independent of theoretical perspective or framework (e.g., grounded theory, phenomenology) but has its beginnings as a quantitative method” where quantitative content analysis gives the answers of “what” and qualitative content analysis answers “why?” and

“analyzing perceptions” (Given, 2000, p. 120). Therefore, the content analysis methodology generally differentiates in literature as Qualitative and Quantitative. For that categorization is inadequate, Hsieh and Shanon (2005) introduced three qualitative content analysis approaches: conventional, directed, and summative. These three approaches are utilized “to interpret meaning from the content of text data” basing on naturalistic paradigm. “The major differences among the approaches are coding schemes, origins of codes, and threats to trustworthiness” (Shanon, 2005, p. 1277).

In this research a conventional Hsieh and Shanon (2005) /inductive (Mayring, 2014) qualitative approach was adopted and Mayring’s (2014) seven steps was followed.

The data were analyzed by following Mayring’s (2014) seven steps for content analysis:

Step 1. Research question was defined and specified via sub-questions in accordance with the purpose of research. The main research question is:

RQ: What is the general outlook of AI adoption in business world?

Step 2: “Linking research question to theory”: As there is not adequate research on management and AI in the age of intelligent machines, and this is a nascent area did not adhere to a specific theory on the issue.

Step 3: “Definition of the research design”: An explorative research design was followed by “Formulating new categories out of the material” (Mayring, 2014, p. 12).

Step 4: “Defining of the (even small) sample or material and the sampling strategy”: For the reason that there are not adequate empirical and theoretical researches on “intelligent machines in business”, it was decided to gather as many as research reports on the issue conducted by prominent research institutes.

Step 5: “Methods of data collection and analysis, pilot tested”: The terms “AI and Business”, “AI and Management”, “AI and CEOs”, “AI and senior management”, “Value of AI” were searched in Google search engine in order to reach relevant reports as far as possible. We also referred to references of the reports, as we reached two reports by this way. Hence, 12 research reports, were published by prominent research institutes, constituted the sample of this research. Table 3 presents detailed information about data.

Table 3. The Data

Report by	Research Institute	Title	Sample
Shanks, Sinha, and Thomas (2015)	Accenture Institute for High Performance (AIHP) and Accenture Strategy	The Impact of Cognitive Computing in Management	1,770 front-line, mid-level and executive-level managers from 14 countries (survey)
Kolbjørnsrud, Thomas, and Amico (2016).	AIHP and Accenture Strategy	The promise of artificial intelligence: Redefining management in the workforce of the future	1,770 front-line, mid-level and executive-level managers from 14 countries (survey)
Thomas, Fuchs and Silverstone (2016)	AIHP	A machine in the C-suite	37 interviews with executives from seven industries and nine countries
Shanks, Sinha and Thomas (2016)	AIHP	Judgment calls: Preparing leaders to thrive in the age of intelligent machines	37 interviews with executives from seven industries and nine countries
SAS (2017)	SAS	The Enterprise AI Promise: Path to Value	Representatives from businesses across EMEA and from a wide range of industry sectors

Halper (2017)	Transforming Data with Intelligence (TDWI)	Advanced Analytics: Moving Toward AI, Machine Learning, and Natural Language Processing	An online survey 267 respondents of business intelligence (BI) and data professionals in TDWI's database. Telephone interview with technical users, business sponsors, and analytics experts. Briefings from vendors that offer products and services related to these technologies
McKinsey Global Institute (2017)	McKinsey Global Institute and Digital McKinsey	Artificial intelligence the next digital frontier?	3,000 AI-aware C-level executives, across 10 countries and 14 sectors
Infosys (2017)	Infosys in collaboration with independent technology market research specialist Vanson Bourne	Amplifying human potential: towards artificial intelligence-A Perspective for CIO's	Interviews with 1,600 IT and business decision-makers from organizations of more than 1,000 employees, with \$500m or more annual revenue and from a range of sectors across seven countries: US, Australia, china, France, Germany, India, UK
PwC (2017)	PwC	20 years inside the mind of the CEO ...What's next?	1,379 CEOs interviewed in 79 countries
Ransbotham, Kiron, Gerbert, and Reeves (2017)	MIT Sloan in collaboration with Boston Consulting Group (BCG)	Reshaping business with artificial intelligence Closing the Gap Between Ambition and Action	a global survey of more than 3,000 executives, managers, and analysts across industries and in-depth interviews with more than 30 technology experts and executives. 112 countries and 21 industries, from organizations of various sizes
PwC (2018)	PwC	The Anxious Optimist in the Corner Office	1,293 interviews with CEOs in 85 countries.
Deloitte Capital Trends (2018)	Deloitte Human Capital Trends	The rise of social enterprise	A global survey of more than 11,000 business and HR leaders, as well as interviews with executives from some of today's leading organizations
Shook and Knickrehm (2018)	The Accenture Research Program	Reworking the Revolution	Interviews with more than 1,200 CEOs and top executives working with AI. More than 14,000 workers were surveyed from 12 industries and 11 economies.
Infosys (2018)	Commissioned by Infosys Conducted by independent market research company Branded Research Inc.	Leadership in the Age of AI: Adapting, Investing and Reskilling to Work Alongside AI	A survey of IT decision makers and senior executives at enterprises in seven countries. The total sample size included 1,053 global C-level executives as well as IT decision makers and influencers of AI technology purchases within their organizations.

In analyzing data, an “inductive category assignment” procedure was followed. The aim of the process is “to arrive at summarizing categories directly, which are coming from the material itself, not from theoretical considerations” (Mayring, 2014, p. 79). The important point to emphasis here is that

inductive qualitative research does not mean employing a pure inducting process. Namely, an “inductive dominant process” was adopted. For the reason that researchers defined the purpose of the research and research questions basing of assumptions, it is clear that the early stage of research is deductive. As it is allowed new categories to emerge then the inductive stage commences, and researchers also test tentative hypothesis emerges during the analysis, and this is also a deduction. Hence, both types of reasoning are employed in the research, but induction is dominant (Armat et al, 2018).

The categories were defined according to research questions and formed during the analysis. A research report was pilot tested whether it meets the purpose of the research and available for category assignment due to research questions, and it was allowed new categories to emerge.

As the pilot test completed, analyses procedure was started. First, the irrelevant parts of the data were omitted, and an analyzing unit was formed that consisted of 12 pairs of Word documents, was assigned for each report. The analyses unit was read line by line carefully, and at second time in-depth, emerging categories was noted in a column next to the texts. By the time main categories were formed, the data was searched in a more detailed manner, to decide whether the categories represent the data.

Step 6: “Processing of the study, presentation of results in respect to the research question”: A cyclic coding analysis was applied to the data. During the analysis, the categories relevant to research questions and also the ones not expected were emerged. The context related categories were gathered under main categories. Categories and sub-categories were presented on a figure and interpreted under titles in detail. As a result, six main categories and sixteen sub-categories were formed. Titles of the categories were defined in accordance with the content of phrases and some of them also directly taken from the text. Examples for coding categories are presented on Table 4, as direct codes and representative codes.

Table 4. Examples for Category Coding

Title of Category	Coding Type	Sample Phrase
Reflections	Representative	<i>“The overwhelming majority of managers believe machines will make them more effective and their work more interesting”</i>
Vague	Representative	<i>“The general feeling was that AI would affect jobs, but it was hard to predict precisely how, and across which geographical areas”</i>
Deployment	Direct	<i>“Organizations are classified under four titles according to their AI deployment”</i>
Human-work	Direct	<i>“... judgment work is human work”</i>

The categories were illustrated on a figure and interpreted under separate titles. Relevance to research questions was taken into account in reporting.

Step 7: “Discussion in respect to quality criteria”: Internal validity, external validity, reliability, and objectivity are originally quality criteria of positivism and accordingly conventional inquiry (Lincoln and Guba, 2013, pp. 102-103). For related criterions are inappropriate for the nature of naturalistic inquiry four terms were established instead: credibility, transferability, dependability and confirmability (Lincoln and Guba: 1988). In content analysis “it is inter-coder reliability which is of particular significance” that means applying coding procedure by different researches independently on the same data and comparing findings. The main point here is “to understand and interpret unreliabilities” (Mayring, 2014, p. 42). Consequently, in this research quality criterion was fulfilled by inter-coder reliability. Authors of the research coded data independently and compered the outcomes, and finally agreed on categories and the content they represent.

Findings

As a result of qualitative content analysis six main categories and sixteen sub-categories were extracted from the data. Findings and brief definitions are presented on Table 5.

Table 5. A Summary of Findings

Categories	Definitions
1. AT PRESENT	Current impact of AI
▪ Reflections	The views of business world on AI.
▪ Benefits of AI	Value creating features of AI
▪ Deployment	The levels of AI adoption of organizations
▪ Macro view	General information about sectors and countries about AI deployment and progress
2. TIME FORWARD	Future impact of AI
▪ Potential	Expectations from AI adoption and potential impacts of AI
▪ Vague	Unforeseen impacts of AI in the future
▪ Emerging jobs	The projected AI-driven jobs
▪ Human-work	The works specific to humans and cannot be achieved by AI in short-term
3. CHALLENGES	The obstacles and concerns business world confront in transformation process
4. ‘MUST DO’S	The actions should be taken by organizations

At Present

The category “AI at present” consists of five codes: Reflections, Benefits of AI, Deployment, and macro view.

Reflections. The sub-category “reflections” represents the views of business world on AI. How organizations, executives, employees react on the issue of AI? Generally, a high optimism on AI is dominant in business world, especially for the potential benefits and future value, but optimism decreases when it comes to organization readiness.

The findings reveal that executives and employees exhibit an enthusiastic stance for promise of AI and refer to AI’s facilitating features as it will provide effectiveness, excitement, competitive advantage to organizations, and also augment core-skills of decision-makers. However, there is also anxiety about organization readiness, adaptation to transformation process, increased competition, and workforce decrease. Therefore, findings can be interpreted as an optimistic but cautious atmosphere is being observed in business world.

Highlight 1→*An optimistic but cautious atmosphere in business world*

Benefits. Value creating features of AI was examined under this sub-category. “Competitive differentiator”, “cost reduction”, “grow revenue”, “supporting human-work”, “time-saver”, “increase effectiveness and productivity”, “complement managers” are the key benefits that were defined in the data. Organizations have been adopting AI applications for these value creating features of AI.

Highlight 2→*Today AI is a compliment and supportive value creating tool*

Deployment. The sub-category ‘deployment’ represents the levels of AI adoption of organizations. According to the findings organizations are experiencing different levels of AI adoption. In Accenture research report stages of adoption were examined under three titles: 1) Education, 2) Prototyping and experimental initiatives, 3) Large-scale application (Applied Intelligence). The organizations in the

sample were positioned in the process moving from “prototyping and experimental initiatives” to “large-scale application” (Shook and Knickrehm, 2018). Similarly, Infosys Report categorized organizations under five titles related to their AI maturity level: 1) Skeptics, 2) Watchers, 3) Explorers 4) Rising Stars 5) Visionaries. Only 25% of organizations were fully deployed AI. 55% were partially deployed or planning to deploy and 9% of them had no intention to do so. (Infosys, 2017). And in the research conducted by MIT Sloan in collaboration with BCG, organizations were classified for AI adoption level under four titles: 1) Pioneers (19%), 2) Investigators (32%), 3) Experimenters (13%), and 4) Passives (36%). The findings of the research also revealed that “The largest companies are the most likely to have an AI strategy”, “about one in five companies has incorporated AI in some offerings or processes”, “one in 20 companies has extensively incorporated AI in offerings or processes”, “Less than 39% of all companies have an AI strategy in place” (Ransbotham, Kiron, Gerbert, and Reeves, 2017).

According to Deloitte Human Capital Trends (2018) report 24% of the organizations in their sample utilizes AI and robotics “to perform routine tasks”, 16 % to “augment human skills”, 7 % to “restructure work entirely”, and it was emphasized in the report that the technical roles have “shifted from STEM to STEAM, where the ‘A’ stands for arts, and the report referenced the involvement of ‘arts’ to Scott Hartley’s book titled *The Fuzzy and the Techie*, Hartley (2017) used the term “the fuzzy and techie” to emphasize the fact that “the best technology and products come from innovations that blend the arts and sciences together” and he supports the idea with his words “We need both context and code, data literacy and data science” (Deloitte Human Capital Trends, 2018, p. 42).

Consequently, organizations are deploying AI but at different levels. The ones do not deploy and have no intention to do so in the future are the ones that will lose in competition and disappear for ‘AI is the new black’ as a key differentiator.

Highlight 3 → *AI is a key differentiator*
The Fuzzy and Techie: “arts” is a required component in new technology
Companies deploy AI but at different levels

A Macro View. General information about sectors and countries about AI deployment and progress were presented under this category.

AI deployment varies across countries and sectors. According to Infosys (2017) report, the level of AI adoption rises from the East. China and India are the prominent countries in AI adoption. The maturity of AI adoption and progress were ranked as: “China 56%, India 55%, Germany 53%, US 46%, UK 44%, France 44%, Australia 40%.” In the report this fact was associated to China and India’s “fewer legacy systems and business processes to contend with.”

The maturity levels of AI adoption by sector was ranked as: “Pharmaceuticals/life sciences 58%, Automotive and aerospace 54%, Telecoms Energy, oil/gas and utilities 52%, Manufacturing 51%, Fast moving consumer goods 50%, Healthcare 50%, Financial services 47%, Retail 44%, Public sector 32%” ,where Pharmaceuticals/life sciences was also the leading industry in considering AI ethics completely as 53% of respondents reported that way. “The leading industries that plan to retain and retrain their workers are: fast moving consumer goods (94%); aerospace and automotive (87%); energy, oil and gas (80%); and pharmaceutical and life sciences (78%).”

Where AI adoption varies across industries, the level of adoption differs in sectors’ divisions. As emphasized in Infosys (2018) report; “the Retail & Consumer Packaged Goods sector skews higher in its use of AI in customer service, the Banking & Insurance sector skews higher in its use of AI for accounting and finance, and the Oil & Gas sector skews higher for its use of AI in operations”

Highlight 4 → *AI rises from the East. China and India are the prominent countries in maturity level of AI adoption*
Pharmaceuticals/life sciences is the leading sector in AI adoption

Time Forward

Potential of AI, expectations, blur sides, future key skills, and human-special works were presented under the category 'Future Value'. The category consists of four subcategories: Potential, vague, human-work, and future key-skills.

Potential. Expectations from AI adoption and potential impacts of AI take part extensively in research reports, and the key findings are listed below:

- Competitive advantage
- Improve performance, productivity, efficiency
- Advisors and partners in workforce
- Augment executives' and employees' work
- Impact on job contents

The key findings of the reports indicate that AI will augment managers' and employees' roles as active advisors and partners, augment executives' judgement work by taking over most of the routine and automated work, and by accelerating decision-making and learning processes (Shanks, Sinha and Thomas, 2016) and also "enable managers to make faster, more thoughtful, collaborative decisions" (Thomas, Fuchs and Silverstone, 2016). Human-machine collaboration will have a significant effect in improving organization performance and sustaining competitive advantage. Job losses in the future is a reality but the emergence of new job contents is also expected (Shook and Knickrehm, 2018). AI tools will increase performance organizations by "improving operational efficiencies, understanding behaviors, and diagnosis" (Halper, 2017) and by "improving forecasting and sourcing, optimizing and automating operations, developing targeted marketing and pricing, and enhancing the user experience (McKinsey, 2017). According to Infosys (2017) report, 97% of respondents believe that AI has a potential of generating a significant ROI (return of investment) by 2010, and "companies expect to see and a 37% average cut in operating costs." "The adoption of AI may have profound effects on the workplace, value creation, and competitive advantage" (Ransbotham, Kiron, Gerbert, and Reeves, 2017).

Highlight 5 → *Augment managers' and employees' roles.*
Human-machine collaboration
Sustaining competitive advantage
Job loses
New job contents

Vague. As the expectations from AI are clear, there is also a blur side due to the unforeseen impacts of AI in the future. The main vague parts of AI were revealed in the reports as:

Managers are hopeful about the potential of AI but there is confusion about the trust issue. An Accenture research revealed this paradox:

"The findings suggest a paradox among respondents. On the one hand, managers at all levels (84 percent) believe machines will make them more effective and their work more interesting. Yet only 14 percent of first-line managers and 24 percent of middle managers would readily trust the advice of intelligent systems in making business decisions in the future. By contrast, nearly half of senior executives (46 percent) would readily trust the advice of intelligent systems" (Shanks, Sinha and Thomas, 2015, p. 4).

The appearance of AI on the scene is a recent issue. So, it is unknown how AI will elevate managerial is not clear for "there is no well-worn path to follow" (Shanks, Sinha and Thomas, 2015, p.4). Another vague part is how the impact of AI will be, as emphasized in SAS report:

“The general feeling was that AI would affect jobs, but it was hard to predict precisely how, and across which geographical areas” (SAS, 2017, p. 19).

“AI is very unlikely to be ‘more of the same’. We do not yet know what changes it will bring, but there will be both ‘known’ and ‘unknowns’” (SAS, 2017, p. 20).

According to reports trust issue, lack of guideline, and uncertainty about the future impacts of AI are the main vague parts.

Highlight 6 → *Trust issue*
Lack of guideline
Uncertainty about the future impact of AI

Emerging Jobs. As it happens in each industrial revolution, job losses are expected that will replace by the emerging ones. The projected AI-driven jobs in the reports are listed below:

According to Accenture research; AI-driven jobs will be “trainers,” “explainers” and “sustainers”:

“Trainers, for example, will help computers learn to recognize faces. Explainers will interpret the results of algorithms to improve transparency and accountability for their decisions, helping to strengthen the confidence of both customers and workers in AI-powered processes. Sustainers will ensure intelligent systems stay true to their original goals without crossing ethical lines or reinforcing bias” (Shook and Mark Knickrehm, 2018, p.14).

According to SAS (2017) report:

“These new jobs will include training AI systems, ensuring that they continue to operate as planned, and do not learn the ‘wrong’ thing, and in bridging the gap between business and technology” (SAS, 2017, p. 20).

SAS (2017) report also emphasized that “the most promising range of new jobs is likely to be in innovation: generating and delivering new ideas that are only possible because of the changes brought about by AI” (p. 20).

And for Deloitte Human Capital Trends (2018) report “newly created jobs are more service-oriented, interpretive, and social, playing to the essential human skills of creativity, empathy, communication, and complex problem-solving” In the report the job titles as “bot trainer,” “bot farmer,” and “bot curator” were expressed as newly created jobs. Examples for bots in the report were:

“In the HR technology domain, vendors of recruitment chatbots such as Textrecruit’s *Ari*, Hiremya.com’s *Mya*, and Paradox.ai’s *Olivia* display the growing adoption of natural language processing” (Deloitte Human Capital Trends, 2018, p. 74)

Training and maintaining such kind of bots and AI systems seems to be an important line of work in the near future.

Highlight 7 → *Training and maintaining AI systems*

Human-work. It is expected that AI will take over some human jobs but what are the human-special ones? The works cannot be achieved by AI in short-term, hence specific to humans were defined in the reports as: ‘judgement skills’ (Thomas et. al., 2016; Shanks et. al., 2016), “Strategic and more creative work, applying intuition and ethical reasoning” “discernment”, “abstract thinking”, “contextual reasoning” (Shanks et. al., 2016, pp. 2-4), “creativity, empathy, communication, and complex problem solving”, “devise, implement, and validate AI solutions” (Deloitte Human Capital Trends, 2018, p. 75).

Highlight 8 → *Cognitive skills as judgement, complex problem solving, creativity etc.
“Devise, implement, and validate AI solutions”*

Challenges

Organizations confront significant and specific challenges in transformation process and also there are concerns about future of business world.

Report findings revealed the following challenges:

- Business world is unprepared, unready to transition, unaware of potential and benefits of AI, and lack of an AI strategy.
- Skill shortages,
- Ethical, legal and regulatory concerns, concerns on job losses, privacy and transparency concerns
- Lack of trust in AI related issues,
- Execution problem,
- Training workforce, data collecting and preparing, training AI algorithms, lack of AI strategy.

Business world is unprepared for the speed of technology which so high, infrastructure is insufficient, and training programs are required for adoption. Most companies do not have an AI strategy which is a crucial factor in gaining competitive advantage. MIT Sloan and BCG report revealed that “the largest companies (those with more than 100,000 employees) are the most likely to have an AI strategy, but only half (56%) have one” Companies need AI plans but “most do not have one, and those that have been slower to move have some catching up to do.” (Ransbotham, Kiron, Gerbert and Reeves, 2017). This fact is a sign for execution problem in organizations. As there is no experimented path to follow, executives are confused how to manage the technological and cultural change. According to AIHP and Accenture Strategy research, “over half (57 percent) responded that their current skills are lacking” (Shanks, Sinha and Thomas, 2016) and in Accenture Research Program report, skills shortages identified as “a key workforce challenge” (Shook and Knickrehm, 2018).

Also there are concerns about privacy, ethical issues, and trust. For the SAS (2017) report findings; trust, data integration to support AI, platform readiness, and ethics emerged as major issues and concerns. And for the TDWI report top four concerns are: “Privacy concerns 46% Ethical concerns 42% Negative customer experience 42% Overreliance on AI, which can mean making mistakes 38%” (Harper, 2017).

Privacy concerns are mostly about the leak of personal data. Ethical concerns are about AI make decisions in the favor of AI systems and job losses in workforce. And the trust issue was considered from the point of both customers and the staff. Customers may prefer human interaction instead of AI and trusting in AI systems may take time. As stated in TDWI report “People often don’t trust what they don’t understand, and many people don’t understand advanced analytics” (Harper, 2017).

Job losses and job changes by the reason of automation are other important challenges. According to SAS (2017) research findings “Changing scope of human jobs/ automation & autonomy 55%” was defined as a major concern as AI progress in business. Deloitte (2018) research defined that “42 % believe automation will have a major impact on job roles over the next two years” and “61% of respondents are actively redesigning jobs around artificial intelligence (AI), robotics, and new business models.” In The Accenture Research Program, it was emphasized that the number of the jobs will not change but the content of the jobs will. However, from the viewpoint of managers handing over some of their current tasks to AI means a significant performance improvement in processes and products. 70% of respondents hope AI will take over some of their current tasks and only 30% of respondents fears that. Consequently, it is expected that the scope of jobs will change and some jobs and tasks will be replaced. At this point, human-machine collaboration becomes more important. Some jobs will disappear, and instead new jobs will emerge as happened in every industrial revolution. Spreading the new culture throughout the organization and make the technology functional in accordance with the

human force is much more difficult than obtaining the new technology and this may cause crucial execution challenges.

Highlight 9 → *Speed of technology is so high*
Lack of skill and infrastructure
Lack of a pathway
Execution problems
Privacy, ethical, and trust concerns
Job changes

‘Must do’s

The new era brings out new requirements. What should organizations do in order to survive in the new age? The answers of this question are examined under the category “must do’s” and following requirements were defined:

- AI strategy
- Combining AI and human intelligence.
- Redesigning processes, structure and culture.
- Developing internal and external trust.
- Basic training on AI systems
- Raising awareness about the benefits of AI
- Taking action as soon as possible
- Addressing ethical concerns
- Collaboration

In the category “Challenges”, it was defined that most of the companies do not have an AI strategy. And “a strategy for AI is urgent” for companies (Ransbotham, et. al, 2017). It is necessary for creating a culture for combining capabilities of human and intelligent machines, addressing the concerns, overcoming the challenges, and as a result gaining competitive advantage. CEO and senior executives should handle this process.

Infosys (2017) report emphasized according to their findings “developing and implementing a holistic AI strategy” is a fundamental:

“Organizations that look to apply an array of technologies across a wider number of areas will position themselves to benefit the most from the potential synergies that AI can offer — not least the anticipated significant ROI benefits in the form of revenue increases and cost reductions. Strong established links between AI adoption and the overall business strategy are a key feature of organizations that are true AI visionaries.”

Implementing strategy requires the participation of employees and customers, and the other external factors as “government, educational and vocational institutes and employees to redesign the workforce” (PWC, 2017). Customers and employees should be informed about the benefits of AI, and employees should be trained about the basics of the AI systems, and “every manager has to develop an intuitive understanding of AI. Processes and structure of organization should be redesigned to free employees from traditional constraints, and an open culture is needed for enabling experimentation” (MIT Sloan and BCG, 2017).

In McKinsey Global Institute’s discussion paper key enablers of transformation process were defined as “leadership from the top, management and technical capabilities, and seamless data access” and following steps were defined as a successful for a successful program (McKinsey Global Institute 2017, p. 4):

1. “Identify the business case”
2. “Set up the right data ecosystem”
3. “Build or buy appropriate AI tools”
4. “Adapt workflow processes, capabilities, and culture”

MIT and BCG report highlighted the vital importance of human-machine collaboration as building off each other’s strong aspects in order to create competitive advantage and presented following advices for executives (Ransbotham et. al., 2018, p. 11):

1. “Learn more about AI”;
2. “Deepen their perspective on how to organize their business around AI”
3. “Develop a more expansive view of the competitive landscape in which their business operates”

Deloitte Human Capital Trends (2018) report presented a new kind of leadership “Symphonic C-suit - new, collaborative, team-based senior executive model” for the social enterprise model of new age. In symphonic leadership, C-Suite acts as a team just like a symphony playing in harmony

In Deloitte’s report the functioning of Symphonic C-Suite defined as:

“Symphonic C-suite brings together multiple elements: the musical score, or the strategy; the different types of instrumental musicians, or the business functions; the first chairs, or the functional leaders; and the conductor, or the CEO. In this model, C-suite members not only lead their own area of responsibility, but also collaborate with other functional leaders, work on teams that affect the enterprise’s strategic direction, and influence and inspire networks of teams throughout the organization” (Deloitte Human Capital Trends, 2018, p.17).

Besides the vitality of this new leadership style, Deloitte defined that Symphonic C-Suite is in its infancy that 54% of the respondents stated that their companies “are not ready, or only somewhat ready, for the level of executive-team collaboration” (Deloitte Human Capital Trends, 2018, p. 20).

Besides the mission of executive team mentioned above, SAS (2017) report highlighted an important future role for data scientists: “Bridging analytics/ IT and Business. Mastering and combining both the social and technical aspects of business is a vital role in future organizations and likely to be undertaken by data scientist.

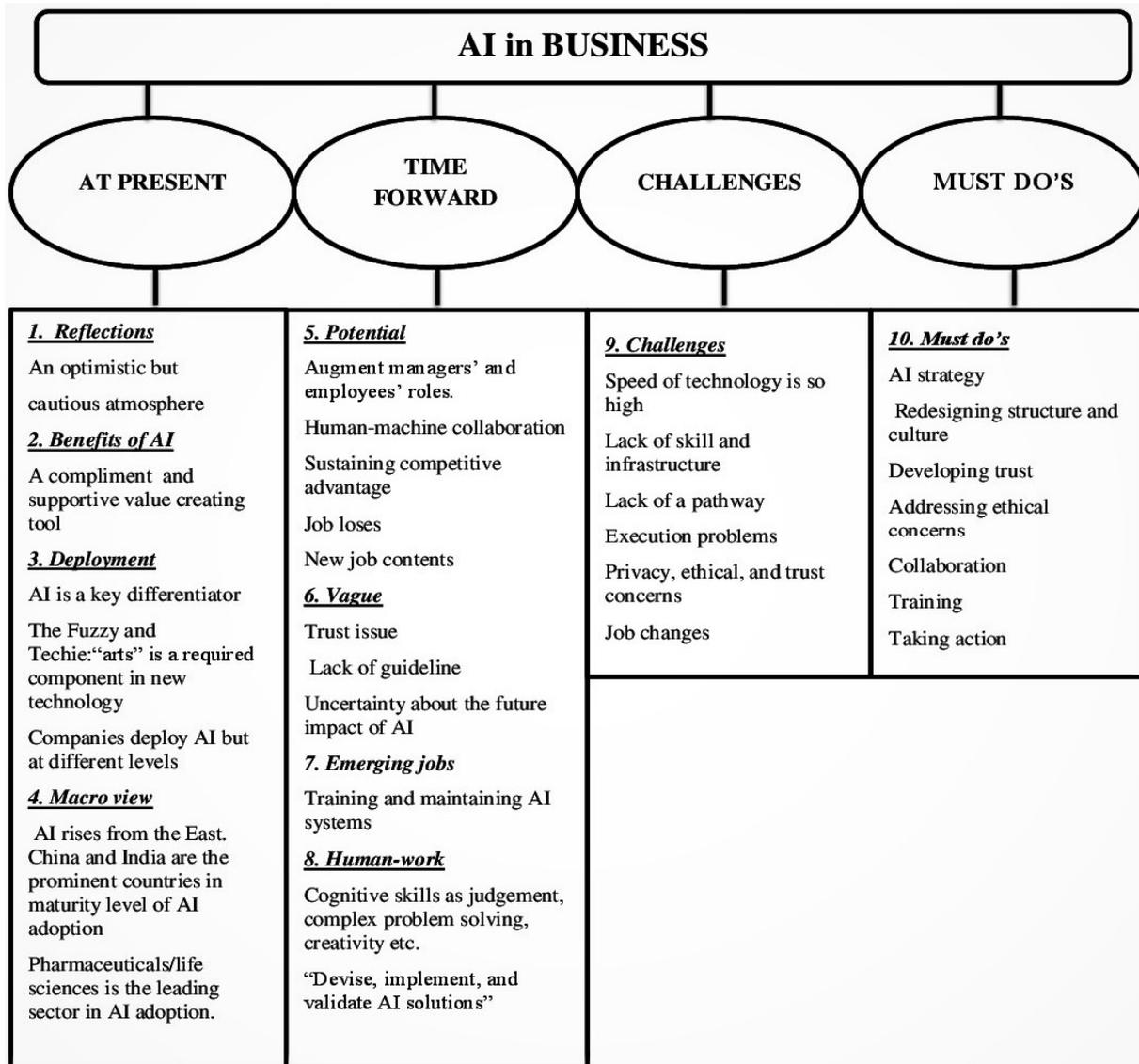
And the other vital issues of the transformation process is considering and addressing ethical issues in an early stage (SAS, 2017) in order to maximize the potential of both AI systems and human workforce (Infosys, 2017).

Consequently, the earlier the companies take action, define strategy, meet the requirements, the more they will adopt AI technology and survive competition in the new era.

Highlight 10 → *AI strategy*
Redesigning structure and culture
Developing trust
Addressing ethical concerns
Collaboration
Training
Taking action as soon as possible

As a result of content analysis, four categories and 10 highlights were defined. The highlights of each category are displayed on Figure 1. The figure presents a summary of findings.

Figure 1. A Summary of Findings



Discussion, Conclusion, and Recommendations

This research was conducted in order to contribute to the efforts of examining impacts of AI on management. As the new are brings about new challenges, the aim of this research is to examine the general outlook of AI adoption in business world.

For this purpose, a sample of 14 research reports on “artificial intelligence and management” were defined, conducted by prominent research institutes- AIHP and Accenture Strategy, The Accenture Research Program, SAS, TDWI, McKinsey Global Institute and Digital McKinsey, Infosys and Branded Research Inc., Infosys and independent technology market research specialist Vanson Bourne, Deloitte, PWC, MIT Sloan and BCG.

A qualitative research methodology -content analysis- was applied to the data by following an exploratory design. As a result of analysis four main categories were constructed titled as: 1) At present, 2) Time Forward, 3) Challenges, and 4) Must do’s. And categories were explained with the findings from the reports, and the key points were emphasized with the highlights at the end of each section.

The first category “At Present” meets the first research question and consists of five sub-categories: Reflections, Benefits of AI, Deployment, and macro view that each represents different aspects of current situation about AI in business. The key points of this category are: Organizations are optimistic but also cautious about AI adoption and future impacts.

Optimistic, because there is awareness about AI facilitate and augment their business, and will more in the future, and also if it is used appropriately AI is a key differentiator in competition. Cautious, because there is not a path to follow for this inexperienced adoption. Also, organizations are unprepared, and unready.

At present, some organizations deploy AI but at different levels, and this level differentiation will also define the rules of competition. It is a fact that the more the organizations adopt AI and integrate through the culture, the more they will gain competitive advantage. Another important finding of this category is that, AI rises from the East, China and India are the prominent companies about the maturity of adopting AI systems. A Pharmaceuticals/life sciences is the leading sector in adopting AI systems.

The second category “Time Forward” represents the future impact of AI and meets the second research question, and consists of four sub categories: Potential, vague, emerging jobs, and human-work. Augmenting feature of AI is a common expectation besides its current facilitator role. AI will augment employees, and in particular executives’ roles that will also cause more time for judgement issues. Human-machine collaboration is a key finding in this category with its vital role in sustaining competitive advantage. Human-workers should be trained in order to produce value with the machine complements, where prominent features of each group will integrate.

Also there are blur sides of integrating AI in organization as trust issue, lack of guidance to follow, and uncertainty about the future impact of AI. Job losses are also an expectation, but the view that new job contents will emerge is dominant in business world as training and maintaining AI systems. Besides, cognitive skills such as judgement, complex problem solving and creativity etc. seem to be human-work in the future. And AI systems also will be handled by humans. Consequently, a takeover of jobs will happen, but new ones will emerge. The change will be observed in the scope and content of jobs, as happened in past technology revolutions.

The third category “Challenges,” reveals the obstacles and concerns business world confronts in transformation process. As the AI technology progress in high-speed, infrastructure and skill deficiencies come forth. Organizations are not ready to meet the requirements, and also there is not a prescript to follow. Rules of the game will be defined as more companies experience the transformation process and thereafter survive. Trust, privacy and ethical concerns are the primary challenges. It takes time for people to get accustomed the new culture and structure, and functioning of a new intelligent machine colleague. Furthermore, the customers may resist to AI solutions, and persist on human communication. All these challenges wait to be solved by the C-suit, and this signals execution problems.

The fourth category “Must do’s”, represent the actions should be taken by organizations in order to achieve transformation process and survive in the age of intelligent machines. The crucial step is to develop and implement an AI strategy, and companies should take action immediately. Trust and ethical issues requires to be addressed at the early stages of process. Raising awareness on the benefits and potential of AI, and collaboration are vital for accelerating the process. Also, training on basics of AI systems is required for executives and employees.

Consequently, AI is the new black and organization should take action immediately to take the advantage. The adopters will survive, and the others will be eliminated. This research presents an outlook on AI adoption in business world. More research, especially qualitative in depth researches are needed in order to define and produce solutions to new era’s challenges as human-machine collaboration, execution problems, and orientation problems.

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