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AI Business Models: A Strategic Business Dynamics

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Abstract

A lot of research has been done recently in evolving the artificial intelligence business model framework. However, one issue is still undeveloped, immature to understood, even it has vital for budding and progressive managers, policy decision makers, and academics alike, namely, how businesses transform and develop their AI business models framework to accomplish continuous value formation. Businesses which achieve to make value over prolonged stages of time effectively figure, acclimate and recommence their business models with AI technology to fuel such value formation. Sketch on verdicts from a research program on uninterruptedly buddingbusinesses. This paper categorizes three perilouscompetences, namely an alignment towards investigating with and manipulatinginnovative business openings; a well-adjusted use of properties; as well as attainingclucidity between management, ethos, and member of staff obligations, together decisive key maneuveringschedules. We conclude the paper by signifyingconsequences for AI business model framework research and experts, providing a tool for executives which permits them to reproduce on and classifyperilousproblems relevant for shifting and emerging their business model to sustain value creation.

In this paper we are trying to explore the keys of Business Model Framework with revolutionizes business market ecosystem.

Introduction

John McCarthy coins the term 'artificial intelligence' in the 1950s, and Marvin Minsky was a well-known scientist in the field [23, 45, 100]. While artificial intelligence's acceptance in conventional society is a new miracle, it is not a new thought. The contemporary field of artificial intelligence came into existence in 1956, but it took decades of work to make momentous development toward evolving an artificial intelligence system and creation it a technological genuineness [23, 45, 98, 111]. Artificial Intelligence is the state-of-the-art technology and most sought in business arena. Artificial intelligence (AI) is intelligence established by machines like to the natural intelligence demonstrated by humans or animals, insects etc. [45, 89, 90, 103]. Machine mimics like human using data and statistical tools available with machine[128, 87, 89]. It is basically the study of intelligent agents which perceives its environment and takes actions which maximize the chance of achieving goals on utmost efficiency as described by most of the books, magazines and journal articles [112, 90]. AI demonstrates the machines which mimic "cognitive" functions that humans associate with the human mind, such as "learning" and "problem solving"[45, 90, 101].The Artificial Intelligence (AI) business platform model is operative with cloud SaaS, Fog and Edge computing model [76, 88, 91]. It concerns about business solutions that can work together on top layer of the other digital business system [21, 71, 89, 101]. AI platform business model entering in the digital and cyber data fluid through the synchronization, running business enrichments over critical scenarios and phases [88, 109]. AI platform business model framework contributes persistent elements and data driven approach with theoretical methods [71, 89, 93]. Artificial Intelligence has various applications like advanced search, intelligent web search engines, recommendation systems used by Google Search Engine, YouTube, OK Google, Amazon and Netflix, Alexa to understanding human speech such as Siri in

Apple phone or Alexa, self-driving cars like Tesla, and competing at the highest level in strategic game systemssuch as chess and Go [90]. AppliedArtificial Intelligence (AAI) has been dynamicbusinesses as establishedby Amazon, Google, Airbnb, Uber, Flipkart, Alphabet, Walmart, Etsy, Costco, Wayfair, Best Buy, Lowe's, Target, Home Depotandother business innovativeness that have unified its use to devicestate-of-the-art business models [88, 91, 92, 105]. These online ventures swiftlyprogressingdigital platform businessmodel innovation[60, 93].They are employing online shopping for retail sales direct to consumers via websites and their business portal and mobile apps [76, 88, 105]. These companies also using live chat, chatbots and voice assistants to communicate their customers [11, 76, 102]. These companies participating their sellers and customers using Business to Consumer (B2C) and Consumer to Consumer (C2C) [5, 67, 108]. They collecting the online data using GPS, Web contacts, Online registration and social media as well [10, 53, 79]. Many business competitors exist in the global market withAI technology to compete their business [3, 9, 55, 90]. AI technology is the significant supporterof digitalbusiness modeland innovation [2, 33, 88]. Applied AI have numerous applications in the arena of business model [65, 91, 111]. It includes how to make machines use language features, abstractions, concepts, pitch and tone of the language for business growth [9, 66, 101, 121]. The giganticand dynamic data are accessible today and the sturdydevelopments of computational powerand algorithms have generated various applications of AI across many diverse industries [1, 79, 87, 98]. Symbolic AI is also playing great role for business model framework[56, 96, 128]. Symbolic AI is predecessor and predominant paradigm of AI, AlphaGo and Deep learning approaches [6, 17, 49, 104]. Symbolic artificial intelligence includes any programming methods and systems that use symbols such as letters andnumbers to encode a human's familiarity, rule-based procedures, and grittystrategy [9, 17, 88, 94].

The goal line of Artificial Intelligence in business is to lookout advance cutting-edge research in the fields of applied intelligence, neural network analysis in business and other domain of business science [19, 88, 91, 123]. Machinelearning innovation develop system and framework that are highest impactful to the business'scustoms and production [20, 89, 90, 100].In the continuation and its significance in Continuous intelligence (CI) is a design pattern and framework in which on line data analytics are interconnected into business processes [16, 87]. Applied Intelligence (AI) is more focused, smarter, closer and more cohesiveapproach forassembling, meting out andevaluating data, formingacumens which help to identify clearopening to act on [18, 21, 90]. In this work we have illustrated how each of these competences is reinforced by different sets of specific actions. Conjointly, these three proficiencies, their actions and the maneuvering actions act as complementarities for value formation. This paper basically deliberates the AI business model framework for innovation and cutting-edge business dynamics

Literature Review On Ai Business Model& Framework

Research Question- *How Artificial Intelligence and Neural networks are motivating the business culture in the digital business platform ecosystem and how it responds on the business model framework to accomplish continuous value formation.*

In this paper we are trying to explore the solutions of these questions which is the need of the times.

Most of the work has been done in business model and its associate applications but there is very less work has been done in the area of AI business model framework. We are trying to fill the gap of the issues in this article. The most recent start-ups and digital platform like Google, Ola, Airbnb, BYJU'S, Uber, Facebook, Instagram, YouTube, eBay, Alibaba, Escty, PayPal, Myntraetc have the AI business technology for their business [88, 90, 101]. They are all platforms' businesses! The success of these envied companies has made the platform business model the sanctified grail of AI business models [88, 94, 122].Before probing how artificial intelligence technologies are affecting the business ecosphere, it's important to define the term. "Artificial intelligence" is a broad and general term that states to any type of computer software that involves in humanlike activities, including learning, planning and problem-solving. Calling specific applications "artificial intelligence" is like calling a 2013 Honda Accord a "vehicle" – it's technically correct, but it doesn't cover any of the specifics. The artificial intelligence is predominant in business, for better understanding we have to think deeper inside [116].

We understand that businesses need to craft evocative understandings for their consumers. Experiences that are enjoyable and amalgamated across all the networks [95]. A digital platform strategy and its business model with applied intelligence aims to enter the online business market by focusing and consenting one section of contributors to help from the incidence or communication and collaboration of others. Conventionally, it is made-up that customers can regulate their inclination to pay for a service or creation self-sufficiently [4]. Nevertheless, Artificial Intelligence Business Platforms (AIPM) model can breakdown this assumption as the participation of a user segment on the platform is interdependent on user choices and its dynamics of data [89, 123]. Recently, Google patented his business marketing as Pay-per-gaze [67, 89, 91]. In this patented AI business model Google plans for eye tracking sensor technology [90]. It gives the idea to reveal some far-reaching plans for the eye-tracking sensor that involves charging advertisers if the user looks at an ad — online or offline — while wearing Google Glass [89]. It exists in the Google business model — but currently isn't formally used — on Google Glass [94]. In the patent, Google is calling it "pay-per-gaze" advertising. Pay per gaze advertising need not be restricted to on-line advertisements, but rather can be stretched to conventional advertisement media including billboards, magazines, newspapers, and other forms of conventional print media. Thus, the gaze tracking system labelled herein offers a mechanism to track and bill offline advertisements in the manner similar to popular online advertisement schemes. Advertisers could be charged based on whether the user observed directly at the ad and, if so, for how long. The patent also says Google could accumulate (and charge advertisers for) analytical data such as how long an ad held the user's gaze and what emotional comeback it produced. Emotional response would be determined, in part, on the user's pupil dilation while looking at the ad. The patent explicitly covers a gaze-tracking technique that uses an eye-tracking sensor to regulate what the wearer is looking at. But what's interesting is what Google says that it might do with a gaze-tracking system in place. This eye tracking sensor technology dynamics of data predict the future growth of business and suggest the probable solutions as per the requirement of business. Formulating a platform strategy for business requires somewhat different products to help entrepreneurs and managers to create and seizure interactive values. The AI platform business model is apropos for housestartups, fledgling trades and growing predictablecreations. For business startups, itsinsolences the break to

capture a segment of recognized sooqs and cultivate hefty reckless. But established companies too can use it with vast success [2, 55, 90]. We can take the example of Apple which is one of the great business systems [88]. A portion of their iPods and iPhone's success is based on the fact that they have used the platform business model [86]. Preceding to these two products the company was struggling for more than a decade.Tom Johnson, chief digital officer at WPP Mindshare argued that:"Alphabet has benefited from the general return of ad spend to the market and especially the balance of that return, which is more focused on digital channels than pre-pandemic"[60, 81]. Alphabet said revenue from Google advertising rose nearly 70% to $50.44 billion during the second quarter ended June 30, 2021 [89]. Retail brands were the biggest contributor to the ad's business' growth, said Philipp Schindler, Google's chief business … [122].

AI and deep neural network can be used for anything,everything andanywhere [127]. The business model framework finds real agents contributing in artificial intelligenceplatform business model framework [94]. These agents embrace not onlyplatform proprietor, operators, users, API developer, and AI application developers.In the framework of AI platforms, it is likely that otheragents and actors have a vivacioustitle role to play as well [86]. Businesscommunity and its subsidiaryis an important agent, as artificial intelligence researchdynamics initiatives are mainly focusing on business advancement-based technology.Unlike for other digital platforms, it gives the impression thatbusiness and ventures take also much more active role in driving business research [123]. There are three lenses for AI business model framework [91, 125]:

Lens-1: Intelligent Product

Lense-2: Intelligent Service

Lense-3: Intelligent Processes which includes Marketing, Process, Operation, HR

Mapping of input and output for business using AI technology is based in data driven approach [21]. Machine learns with the existing data and produce the output based on previous data for better decision and profits.Automated data collection and labeling isa unique to AI platforms.

Moreover, AI platforms are interweaved with otherNeural network based digital platforms, often controlled by the same agent.

Current technological trends of platformbusiness model

The platform businessmodel frameworkalong with artificial and deep neural network algorithms is developing very fast which unsurprisinglyinfluence the business culture, business modeling, platform scaling, load balancing, selling and buying behavior, patternanalysis and even the communication trend for business [41]. Thus, range of actors with important roles for AI platform vitality might be wider than for other digital platforms [37]. What constitutes core and periphery of an AI platform? A wide range of technologies is used in the AI application technology stack [37, 45]. Both, software and hardware can be considered as a part of platform core. Outlying modules might include a bigger spectrumthan for other

types of digital platforms [44]. For example, iOS apps or Airbnb presentrestricted to their explicit context – Apple creation use real estate hiring respectively[49, 78]. Applied intelligencetechnologies and methods are not close-fitting to any framework and their use is not constrained in the same manner [29, 42]. But the question is what is the global AI platform framework?Framework of a platform is “a conceptual proposal that describes how the ecosystem is partitioned into a relatively stable platform and a harmonizing set of modules that are reinvigorated to vary, and the innovativeness rules binding on both” [48, 62]. Although, it is not clear whether a single AI platform framework dominates or whether each AI platform is substantially distinct in this respect [36, 65, 125]. Also, comparison of AI platform framework with that of other types of digital platforms could reveal new insights[26, 40, 66]. Furthermore, the presence of complementarities has been considered as one of the key characteristics of platforms [34, 68, 124]. A business framework is a procedure and central base of what functioning policies control a business or institution [22, 64, 78]. The optimalselection of a business framework hangs on the business, the executive structure, the tacticalscheduling and systemsdesign [38, 122]. One of the informal ways to evoke the difference between a framework and platform is that, despite both including toolkits for mobile growth, frameworks operate as software-only frames for building applications, and platforms operate as hardware and software systems that support run applications [33, 70].

A Global Study: What Consumers Really Think About AI

In a recent comprehensive study tells that while consumers are optimistic about the benefits of Artificial Intelligence (AI), Machine Learning (ML) and Deep Learning Neural Network (DLNN)-based business model, they also express anxiety and misunderstanding about how businesses use AI, ML and Deep learning model to engage them efficiently in complex situations and if have misleading data [75].AI is composed to renovate everyday business life, together with how consumers interrelateand networked with businessesaffairs [69, 119]. While the positive aspect of that is mammoth for both parties, there are educational and emotional sprints to be cleared before consumers feel comfortable enough to use AI and ML to its burstinglatent[35, 50]. A survey of 6,000 consumers across six countries showed a wide range in understanding, attitudes, and receptiveness towards AI and ML [36, 50, 66, 89, 98, 127].According to a World Economic Forum’s (WEF) report, AI-enabled automation will produce 133 million new trades globally by 2022[14, 67,89,91,101,128]. Following Fig-1shows the consumers insight about the AI in business [43].

And in India itself, the demand for AI and ML talent pool is expected to rise steeply with the government’s steps towards digitization, and multiple system of government accelerating their digital transformation initiatives [47, 74]. We have to ready to drive the wave.

The AI and ML Stepping stone to the future is elaborated in the Fig-2: as below

AI Platform Framework,Strategy and Governance

AI-enabled platform framework is much needed in business diaspora [2, 14, 96]. It creates value creation and business growth in all dimensions but it is not clear whether and how some AI platform framework

create superior complementarities [2, 28, 56].Digitization, Personalization and Interaction & Engagement is a sequential path of the strategy, governance and framework [13, 30, 120]. The work flow may be defined as below fig-3 [42, 72, 121].

Hybrid platform framework and its services through cloud SaaS model, on-premises platform-in-a-box with syndicates storage, compute, networking and software is a part of AI platform framework [9, 45].The AI work flow for business platform is defined as below in fig -4[7, 127].

As the diagram indicates, AI Platform can manage the following stages in the ML workflow:

Step-1 Train your ML business model on your data:

Step-2 Train model

Step-3 Evaluate model accuracy

Step-4 Tune hyperparameters

Step-5 Deploy your trained model.

Step-6 Send prediction requests to your model:

Step-7 Online prediction

Step-8 Batch prediction

Step-9 Monitor the predictions on an ongoing basis.

Step-10 Manage your models and model versions.

Digital Platform Business Framework

A digital platform business framework is a comprehensive reliant plan of action that a business uses to accomplish its goal line in the marketplace [8, 97]. It lists out the innumerable possible state of affairs. Business is expected to find itself in and postulates the set of actions that it should take in each of the situations in order to attain its goals in the market [50, 54].

The digital platformframework is pictorially illustrated in below Fig 5.

A platform business strategy allows business proprietors to make best decisions connected to business, operations, and business finances [6, 53]. It also supports the business risks effectively [15, 65, 103]. It is also concerned with choosing specific business tools like AI and ML with platform strategy and framework. The following figure-6 shows the workflow for AI-platform strategy framework.

AI Platform is a managed service that enables to easily build machine learning business models, that work on any type of data, of any size [51, 104]. Create model with the powerful TensorFlow framework that powers many Google products, from Google Photos to Google Cloud Speech on business framework [1, 87, 89, 118]. The platform strategy in pictorial way is defined by rossdawson.com as below in fig -7.

Platform strategy is also very much pertinent with Explainable AI (XAI) in business ecosphere. Explainable AI is a set of tools and frameworks to assist and interpret predictions made by machine learning business models [6, 61, 73]. It can debug and improve business model performance, and assist others understand business models' behavior and pattern. It also generates feature attributions for model predictions in AutoML Tables and AI Platform, and visually investigate model behavior using the What-If Tool. Reduce model monitoring efforts by 35% to 50%. Increase model accuracy by 15% to 30% [88, 114]. Increase net profits on a data and AI platform.The structure of platform design and governance is depicted as below in fig-8 [71, 112, 127].

Sketch of Cloud AI platform strategy is defined as below.

How are businesses using artificial intelligence? The below steps show the google cloud platform strategy.

gcloudai-platform

NAME

gcloudai-platform - manage AI Platform jobs and models

SYNOPSIS

gcloudai-platform ***GROUP*** | ***COMMAND*** [***GCLOUD_WIDE_FLAG …***]

DESCRIPTION

The gcloudai-platform command group lets you manage AI Platform jobs and training models.

GCLOUD WIDE FLAGS

These flags are available to all commands:

Run $ gcloud help for details.

GROUPS

GROUP is one of the following:

jobs

AI Platform Jobs commands.

local

AI Platform Local commands.

models

AI Platform Models commands.

operations

Manage AI Platform operations.

versions

AI Platform Versions commands.

COMMANDS

COMMAND is one of the following:

predict

Run AI Platform online prediction.

Application of Artificial Intelligence in Business Framework

Artificial intelligence (AI) is progressivelyfleeting into everyday business use[119]. From workflow management to trend predictions. AI has many different uses in business [52].Artificial Intelligence (AI)also delivers new business openings [117].Many societies still subordinate artificial intelligence with science fiction dystopias, but that classification is diminishing as artificial intelligence advances and becomes more usual in our day-to-daybreathes. Today, artificial intelligence is a domestic name (and sometimes even a home presence – hi, Alexa!, OK Google, Hi Siri, etc)[88, 119].In commercial and business organizations, artificial intelligence has a vast range of applications and uses[29, 113]. In fact, most of us interrelate with artificial intelligence in some form or another on a regular basis. From the commonplace to the spectacular, artificial intelligence is already unsettlingeffectively every business process in every manufacturing. As artificial intelligence technologies flourish, they are becoming an imperious for businesses that famine to sustain a modest edge[24, 55, 89].

Benefits of AI platform Strategy

- **Optimize AI and cloud economics**

Put multi-cloud AI to work for business. Use flexible consumption models. Build and deploy AI anywhere [22, 91].

- **Predict outcomes and prescribe actions**

Optimize schedules, plans and resource allocations using predictions. Simplify optimization modeling with a natural language interface [25].

- **Synchronize apps and AI**

Unite and cross-train developers and data scientists. Push models through REST API across any cloud. Save time and cost managing disparate tools [67].

- **Unify tools and increase productivity for Model**

Operationalize enterprise AI across clouds. Govern and secure data science projects at scale [23].

- **Deliver fair, explainable AI (XAI)**

The business benefits of AI depict through the following figure as it was surveyed on 250 executives who were familiar with their companies use of technologies to learn about third goals for AI initiatives [98]. More than half said their primary goals was to make existing products better[7, 28, 86, 115]. Reducing head count was mentioned by only 22%. The following figure-9 show the percentage of executives who cite the benefits of AI.

Conclusions

This study first delivers an ephemeral impression of AI and XAI, contemporary issues being attempted in evolving AI and defines how it transformson business frameworks. Our interpretation of platform-orientedcompanies transfigured their business models using artificial intelligence in prospective system. We deliberated how managers can craft an innovative AI-based ethos, which rearticulates the progression of AI-based business model modernization. Businesses that effectively take advantage of on AI can make unsettling revolution from side to side their new digital business models and practices, empowering them to possiblytransmute the worldwideeconomical business landscape.It seems emerging a culture of novelty often runs antagonistic to by conventional designand self-consciousinterpretation. Significant fulcraentail a positive degree offreedom to take possibilities and revelation to a lens that is unaccustomed. Uppermostexecutives and leaders, perform a significantand strategic starring role in instituting the culture of a business so they must exemplaryrevolution and a readinessto frequently learn and innovate with state-of-the-art-technology. They could open by culture with cutting edge technology-AI and by what method it can enrichthe enterprise's AI business model and coordination, as well as boosting and gratifyingworkforces whoattain AI proficiency and take-offflyerventures in the business.We have focused on the tactical implications and business innovations through AI. We also explore the roots of applied AI insights, framework with data conceptions.

Abbreviations

AI-Artificial Intelligence

AAI- Applied Artificial Intelligence

AIPM-Artificial Intelligence Business Platforms

B2C-Business to Consumer

BI- Business Intelligence

C2C-Consumer to Consumer

CI- Continuous Intelligence

BM- Business Model

DBM-Digital Business Model

DLNN-Deep Learning Neural Network

DP-Digital Platform

MI- Machine Intelligence

ML-Machine Learning

CI- Computation Intelligence

PBM- Platform Business Models

XAI-Explainable Artificial Intelligence

WEF-World Economic Forum's

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References

1. Agarwal, Y., Jain, M., Sinha, S., &Dhir, S. (2020). Delivering high-tech, AI-based health care at Apollo Hospitals. *Global Business and Organizational Excellence*, *39*(2), 20-30.
2. Abramowitz, A. I. (1988). An improved model for predicting presidential election outcomes. *PS: Political Science & Politics*, *21*(4), 843-847.
3. Akerkar, R. (2019). *Artificial intelligence for business*. Springer.
4. Aldinucci, M., Rabellino, S., Pironti, M., Spiga, F., Viviani, P., Drocco, M., ... & Drago, I. (2018, May). HPC4AI: an AI-on-demand federated platform endeavour. In *Proceedings of the 15th ACM International Conference on Computing Frontiers* (pp. 279-286).
5. Alhashmi, S. F., Salloum, S. A., & Abdallah, S. (2019, October). Critical success factors for implementing artificial intelligence (AI) projects in Dubai government United Arab Emirates (UAE) health sector: Applying the extended technology acceptance model (TAM). In *International Conference on Advanced Intelligent Systems and Informatics* (pp. 393-405). Springer, Cham.
6. ALOSI, A., & PARMA, P. (2020). Natural language processing and its applications: frameworks proposal and business analysis.
7. Antón, A. I., McCracken, W. M., & Potts, C. (1994, June). Goal decomposition and scenario analysis in business process reengineering. In *International Conference on Advanced Information Systems Engineering* (pp. 94-104). Springer, Berlin, Heidelberg.
8. Antony, J., &Preece, D. (Eds.). (2002). *Understanding, managing and implementing quality: Frameworks, techniques and cases*. Routledge.
9. Arnold, T., &Scheutz, M. (2018). The “big red button” is too late: an alternative model for the ethical evaluation of AI systems. *Ethics and Information Technology*, *20*(1), 59-69.
10. Armour, J., &Sako, M. (2020). AI-enabled business models in legal services: from traditional law firms to next-generation law companies?*Journal of Professions and Organization*, *7*(1), 27-46.
11. Åström, J. (2020). Value creation and value capture in AI offerings: A process framework on business model development.
12. Benkler, Y. (2019). Don't let industry write the rules for AI. *Nature*, *569*(7754), 161-162.
13. Boire, R. (2017, December). Artificial intelligence (AI), automation, and its impact on data science. In *2017 IEEE International Conference on Big Data (Big Data)* (pp. 3571-3574). IEEE.
14. Boza, P., &Evgeniou, T. (2021). Implementing Ai Principles: Frameworks, Processes, and Tools.
15. Brock, J. K. U., & Von Wangenheim, F. (2019). Demystifying AI: What digital transformation leaders can teach you about realistic artificial intelligence. *California Management Review*, *61*(4), 110-134.
16. Bulut, Y. E. (2018). *AI for data science: artificial intelligence frameworks and functionality for deep learning, optimization, and beyond*. Technics Publications.
17. Burgess, A. (2018). AI in Action. In *The Executive Guide to Artificial Intelligence* (pp. 73-89). Palgrave
18. Burgess, A. (2017). *The Executive Guide to Artificial Intelligence: How to identify and implement applications for AI in your organization*. Springer.

19. Casadesus-Masanell, R., &Ricart, J. E. (2011). How to design a winning business model. *Harvard business review*, *89*(1/2), 100-107.
20. Chan, L., Morgan, I., Simon, H., Alshabanat, F., Ober, D., Gentry, J., ... & Cao, R. (2019, June). Survey of AI in cybersecurity for information technology management. In *2019 IEEE Technology & Engineering Management Conference (TEMSCON)* (pp. 1-8). IEEE.
21. Chang, T. M., Hsu, M. F., & Lin, S. J. (2018). Integrated news mining technique and AI-based mechanism for corporate performance forecasting. *Information Sciences*, *424*, 273-286.
22. Chanson, M., Bogner, A., Bilgeri, D., Fleisch, E., & Wortmann, F. (2019). Blockchain for the IoT: privacy-preserving protection of sensor data. *Journal of the Association for Information Systems,* 20(9), 10.
23. Chan, H. C. (2015). Internet of things business models. *Journal of Service Science and Management,* 8(04), 552.
24. Charif, B., &Awad, A. I. (2014, September). Business and government organizations' adoption of cloud computing. In *International Conference on Intelligent Data Engineering and Automated Learning* (pp. 492-501). Springer, Cham.
25. Chui, M., Manyika, J., Miremadi, M., Henke, N., Chung, R., Nel, P., & Malhotra, S. (2018). Notes from the AI frontier: Insights from hundreds of use cases. *McKinsey Global Institute*.
26. Ciuriak, D. (2019). Economics of AI/ML and Big Data in the Data-Driven Economy: Implications for Canada's Innovation Strategy. *ML and Big Data in the Data-Driven Economy: Implications for Canada's Innovation Strategy (March 25, 2019)*.
27. Clark, J., & Hadfield, G. K. (2019). Regulatory Markets for AI Safety. *arXiv preprint arXiv:2001.00078*.
28. Corea, F. (2019). *Applied artificial intelligence: Where AI can be used in business* (Vol. 1). Springer International Publishing.
29. Corea, F. (2019a). How AI Is Changing the Insurance Landscape. In *Applied Artificial Intelligence: Where AI Can Be Used In Business* (pp. 5-10). Springer, Cham.
30. Cosenz, F. (2017). Supporting start-up business model design through system dynamics modelling. *Management Decision*.
31. Daugherty, P. R., & Wilson, H. J. (2018). *Human+ machine: Reimagining work in the age of AI*. Harvard Business Press.
32. Davenport, T. H. (2018). *The AI advantage: How to put the artificial intelligence revolution to work*. MIT Press.
33. Dellermann, D., Calma, A., Lipusch, N., Weber, T., Weigel, S., &Ebel, P. (2019, January). The future of human-AI collaboration: a taxonomy of design knowledge for hybrid intelligence systems. In *Proceedings of the 52nd Hawaii International Conference on System Sciences*.
34. Díaz-Díaz, R., Muñoz, L., & Pérez-González, D. (2017). Business model analysis of public services operating in the smart city ecosystem: The case of SmartSantander. *Future Generation Computer Systems*, *76*, 198-214.

35. Dimitras, A. I., Zanakis, S. H., &Zopounidis, C. (1996). A survey of business failures with an emphasis on prediction methods and industrial applications. *European Journal of Operational Research*, *90*(3), 487-513.
36. Dimitras, A. I., Slowinski, R., Susmaga, R., &Zopounidis, C. (1999). Business failure prediction using rough sets. *European Journal of operational research*, *114*(2), 263-280.
37. El-Najdawi, M. K., &Stylianou, A. C. (1993). Expert support systems: integrating AI technologies. *Communications of the ACM*, *36*(12), 55-ff.
38. Eiteman, D. K., Stonehill, A. I., & Moffett, M. H. (1989). *Multinational business finance*. Pearson Education India.
39. El-Ansary, A. I. (2006). Marketing strategy: taxonomy and frameworks. *European business review*.
40. Ferrario, A., Loi, M., &Viganò, E. (2019). In AI we trust incrementally: a multi-layer model of trust to analyze human-artificial intelligence interactions. *Philosophy & Technology*, 1-17.
41. Fountaine, T., McCarthy, B., & Saleh, T. (2019). Building the AI-powered organization. *Harvard Business Review*, *97*(4), 62-73.
42. Frank, M., Roehrig, P., &Pring, B. (2017). *What to do when machines do everything: How to get ahead in a world of ai, algorithms, bots, and big data*. John Wiley & Sons.
43. Furman, J., & Seamans, R. (2019). AI and the Economy. *Innovation Policy and the Economy*, *19*(1), 161-191.
44. Gentsch, P. (2019). AI Business: Framework and Maturity Model. In *AI in Marketing, Sales and Service* (pp. 27-78). Palgrave Macmillan, Cham.
45. Gentsch, P. (2018). *AI in marketing, sales and service: How marketers without a data science degree can use AI, big data and bots*. Springer.
46. Gentsch, P. (2018a). *AI in marketing, sales and service: How marketers without a data science degree can use AI, big data and bots*. Springer.
47. Ghanavati, S., Amyot, D., & Peyton, L. (2011, August). A systematic review of goal-oriented requirements management frameworks for business process compliance. In *2011 Fourth International Workshop on Requirements Engineering and Law* (pp. 25-34). IEEE.
48. Ghoreishi, M., &Happonen, A. (2020). New promises AI brings into circular economy accelerated product design: a review on supporting literature. In *E3S Web of Conferences* (Vol. 158, p. 06002). EDP Sciences.
49. Giotopoulos, K., Alexakos, C., Beligiannis, G., & Stefani, A. (2012). Bringing AI to e-learning: The case of a modular, highly adaptive system. In *Advancing Education with Information Communication Technologies: Facilitating New Trends* (pp. 126-138). IGI Global.
50. González-González, I., & Jiménez-Zarco, A. I. (2014). The MOOC phenomenon: the current situation and an alternative business model. *eLearn Center Research Paper Series*, 26-33.
51. Gursoy, D., Chi, O. H., Lu, L., &Nunkoo, R. (2019). Consumer's acceptance of artificially intelligence (AI) device use in service delivery. *International Journal of Information Management*, *49*, 157-169.

52. Hagras, H. (2018). Toward human-understandable, explainable AI. *Computer*, *51*(9), 28-36.
53. Hosen, M. S. (2020). O2O Business Model of Meituan in China. *Global Disclosure of Economics and Business*, *9*(1), 49-66.
54. Huang, Z., & Hu, Y. Q. (2003, November). Applying AI technology and rough set theory to mine association rules for supporting knowledge management. In *Proceedings of the 2003 International Conference on Machine Learning and Cybernetics (IEEE Cat. No. 03EX693)* (Vol. 3, pp. 1820-1825). IEEE.
55. Hamscher, W. (1994). AI in business-process reengineering. *Ai Magazine*, *15*(4), 71-71.
56. Hedberg, S. R. (1996). AI tools for business-process modeling. *IEEE Expert*, *11*(4), 13-15.
57. Hedman, J., &Kalling, T. (2003). The business model concept: theoretical underpinnings and empirical illustrations. *European journal of information systems*, *12*(1), 49-59.
58. Iansiti, M., & Lakhani, K. R. (2020). Competing in the Age of AI.
59. Jarke, M., &Radermacher, F. J. (1988). The AI potential of model management and its central role in decision support. *Decision Support Systems*, *4*(4), 387-404.
60. Johnson, M. W., Christensen, C. M., &Kagermann, H. (2008). Reinventing your business model. *Harvard business review*, *86*(12), 57-68.
61. Kannan, P. K., Chang, A. M., &Whinston, A. B. (2000). Electronic communities in e-business: Their role and issues. *Information Systems Frontiers*, *1*(4), 415-426.
62. Kearney, P. (2002). Integrating AI planning techniques with workflow management system. *Knowledge-Based Systems*, *15*(5-6), 285-291.
63. Khodaei, H., &Ortt, R. (2019). Capturing dynamics in business model frameworks. *Journal of Open Innovation: Technology, Market, and Complexity*, *5*(1), 8.
64. Kokkinaki, A. I., Dekker, R., De Koster, M. B. M., Pappis, C., & Verbeke, W. J. M. I. (2002, April). E-business models for reverse logistics: Contributions and challenges. In *Proceedings. International Conference on Information Technology: Coding and Computing* (pp. 470-476). IEEE.
65. Kosinski, M., Stillwell, D., & Graepel, T. (2013). Private traits and attributes are predictable from digital records of human behavior. *Proceedings of the national academy of sciences*, *110*(15), 5802-5805.
66. Lambert, S. C. (2012). *Deconstructing business model frameworks using a reference model*. Centre for Accounting, Governance and Sustainability, University of South Australia.
67. Lee, K. F. (2018). *AI superpowers: China, Silicon Valley, and the new world order*. Houghton Mifflin Harcourt.
68. Lee, K., & Ha, N. (2018, January). AI platform to accelerate API economy and ecosystem. In *2018 International Conference on Information Networking (ICOIN)* (pp. 848-852). IEEE.
69. Leisenring, J., Linsmeier, T., Schipper, K., & Trott, E. (2012). Business-model (intent)-based accounting. *Accounting and Business Research*, *42*(3), 329-344.
70. León, M. C., Nieto-Hipólito, J. I., Garibaldi-Beltrán, J., Amaya-Parra, G., Luque-Morales, P., Magaña-Espinoza, P., & Aguilar-Velazco, J. (2016). Designing a model of a digital ecosystem for healthcare

and wellness using the business model canvas. *Journal of medical systems*, *40*(6), 144.

71. Li, C. Y., Yang, A. M., Man, J. F., & Ying, J. (2006). An Approach to Constructing Business Model for Services Integration According to Requirement. *CHINESE JOURNAL OF COMPUTERS-CHINESE EDITION-*, *29*(7), 1095.
72. Ligęza, A., &Potempa, T. (2014). AI approach to formal analysis of bpmn models: Towards a logical model for bpmn diagrams. In *Advances in Business ICT* (pp. 69-88). Springer, Cham.
73. Liu, F., Lv, Y., Yang, P., Liu, Y., Xu, Z., & Luo, J. (2020, April). Innovation of business model for electrical household appliance enterprises to deploy IoT+ AI and IoT+ 5G. In *2020 International Conference on E-Commerce and Internet Technology (ECIT)* (pp. 245-247). IEEE.
74. Lo'ai, A. T., Mehmood, R., Benkhlifa, E., & Song, H. (2016). Mobile cloud computing model and big data analysis for healthcare applications. *IEEE Access*, *4*, 6171-6180.
75. Loebbecke, C., & Picot, A. (2015). Reflections on societal and business model transformation arising from digitization and big data analytics: A research agenda. *The Journal of Strategic Information Systems*, *24*(3), 149-157.
76. Luo, S., Lin, X., & Zheng, Z. (2019). A novel CNN-DDPG based AI-trader: Performance and roles in business operations. *Transportation Research Part E: Logistics and Transportation Review*, *131*, 68-79.
77. Macmillan, Cham. Burgess, A. (2017). *The Executive Guide to Artificial Intelligence: How to identify and implement applications for AI in your organization*. Springer.
78. Maedche, A., Legner, C., Benlian, A., Berger, B., Gimpel, H., Hess, T., ... &Söllner, M. (2019). AI-based digital assistants. *Business & Information Systems Engineering*, *61*(4), 535-544.
79. Martín, C., Langendoerfer, P., Zarrin, P. S., Díaz, M., & Rubio, B. (2021). Kafka-ML: connecting the data stream with ML/AI frameworks. *Future Generation Computer Systems*.
80. Massa, L., Tucci, C. L., &Afuah, A. (2017). A critical assessment of business model research. *Academy of Management Annals*, *11*(1), 73-104.
81. Metelskaia, I., Ignatyeva, O., Denef, S., &Samsonowa, T. (2018, June). A business model template for AI solutions. In *Proceedings of the International Conference on Intelligent Science and Technology* (pp. 35-41).
82. Mathew, P. S., & Pillai, A. S. (2021). Boosting Traditional Healthcare-Analytics with Deep Learning AI: Techniques, Frameworks and Challenges. In *Enabling AI Applications in Data Science* (pp. 335-365). Springer, Cham.
83. Melnyk, S. A., Narasimhan, R., &DeCampos, H. A. (2014). Supply chain design: issues, challenges, frameworks and solutions.
84. Milkau, U. (2019). Value Creation within AI-enabled Data Platforms. *Journal of Creating Value*, *5*(1), 25-39.
85. Mishra, S. (2018). Financial management and forecasting using business intelligence and big data analytic tools. *International Journal of Financial Engineering,* 05 (02):1850011

86. Mishra, S., (2019). Performance analysis of women in Central Bank Monetary System using business intelligence. *Global Journal of Management and Business Research*.
87. Mishra, S., &Triptahi, A. R. (2019a). Platforms oriented business and data analytics in digital ecosystem. *International Journal of Financial Engineering*, 6(04), 1950036.
88. Mishra, S., & Tripathi, A. R. (2020). Platform business model on state-of-the art business learning use case. *International Journal of Financial Engineering*, 2050015.
89. Mishra, S., & Tripathi, A.R. (2020a). IoT Platform Business Model for Innovative Management Systems. International Journal of Financial Engineering, 2050030. https://doi.org/10.1142/S2424786320500309.
90. Mishra, S., & Tripathi, A.R. (2020b). Literature review on business prototypes for digital platform. *J InnovEntrep***9,** 23 (2020). https://doi.org/10.1186/s13731-020-00126-4.
91. Mishra, S., & Tripathi, A. R. (2020c). Internet of Everything's: Next Generation Business Model, Digital Business, Elsevier (Accepted for publication).
92. Morley, J., Floridi, L., Kinsey, L., &Elhalal, A. (2019). From what to how. An overview of AI ethics tools, methods and research to translate principles into practices. *arXiv preprint arXiv:1905.06876*.
93. Mrass, V., Peters, C., &Leimeister, J. M. (2018). Managing complex work systems via crowdworking platforms: how Deutsche Bank explores AI trends and the future of banking with Jovoto. In *Proceedings of the 51st Hawaii International Conference on System Sciences (2018)*.
94. Muthusamy, V., Slominski, A., &Ishakian, V. (2018, September). Towards enterprise-ready AI deployments minimizing the risk of consuming AI models in business applications. In *2018 First International Conference on Artificial Intelligence for Industries (AI4I)* (pp. 108-109). IEEE.
95. Muthuveloo, R., & Ping, T. A. (2013). Achieving business sustainability via I-TOP model. *American Journal of Economics and Business Administration*, *5*(1), 15.
96. Niu, W., Li, G., Tang, H., Zhou, X., & Shi, Z. (2011). CARSA: A context-aware reasoning-based service agent model for AI planning of web service composition. *Journal of Network and Computer Applications*, *34*(5), 1757-1770.
97. Okuda, T., &Shoda, S. (2018). AI-based chatbot service for financial industry. *Fujitsu Scientific and Technical Journal*, *54*(2), 4-8.
98. O'Sullivan, S., Nevejans, N., Allen, C., Blyth, A., Leonard, S., Pagallo, U., ... &Ashrafian, H. (2019). Legal, regulatory, and ethical frameworks for development of standards in artificial intelligence (AI) and autonomous robotic surgery. *The International Journal of Medical Robotics and Computer Assisted Surgery*, *15*(1), e1968.
99. Paul, A., Haque Latif, A., Amin Adnan, F., & Rahman, R. M. (2019). Focused domain contextual AI chatbot framework for resource poor languages. *Journal of Information and Telecommunication*, *3*(2), 248-269.
100. PĂUNESCU, C., PASCU, A. I., & POP, O. (2016). Social Enterprise: How does this Way of doing Business differ from other Forms of Enterprise?.*Quality-Access to Success*, *17*(153).

101. Peters, C., Blohm, I., &Leimeister, J. M. (2015). Anatomy of successful business models for complex services: Insights from the telemedicine field. *Journal of management information systems*, *32*(3), 75-104.
102. Rathod, Y., & Rathod, R. (2006). *U.S. Patent Application No. 11/171,520*.
103. Ray, A. (2018). *Compassionate Artificial Intelligence: Frameworks and Algorithms*. Compassionate AI Lab (An Imprint of Inner Light Publishers).
104. Rayna, T., &Striukova, L. (2016). 360° Business Model Innovation: Toward an Integrated View of Business Model Innovation: An integrated, value-based view of a business model can provide insight into potential areas for business model innovation. *Research-Technology Management*, *59*(3), 21-28.
105. Richardson, J. E. (2005). The business model: an integrative framework for strategy execution. *Available at SSRN 932998*.
106. Rebner, A., &Olofsson, M. (2020). Applied AI: Management Frameworks for Internal Virtual Assistant Implementation.
107. Remane, G., Hanelt, A., Nickerson, R. C., & Kolbe, L. M. (2017). Discovering digital business models in traditional industries. *Journal of Business Strategy*.
108. Rong, K., Lin, Y., Shi, Y., & Yu, J. (2013). Linking business ecosystem lifecycle with platform strategy: a triple view of technology, application and organisation. *International journal of technology management*, *62*(1), 75-94.
109. Samsung White Paper (July 14, 2020):*https://research.samsung.com/next-generation-communications*(Retrieve on July 16, 2020 at 10.40 pm IST).
110. Schank, R. C. (1991). Where's the AI?.*AI magazine*, *12*(4), 38-38.
111. Shae, Z., & Tsai, J. (2019, July). AI blockchain platform for trusting news. In *2019 IEEE 39th International Conference on Distributed Computing Systems (ICDCS)* (pp. 1610-1619). IEEE.
112. Schulte, P., & Liu, G. (2017). FinTech Is Merging with IoT and AI to Challenge Banks: How Entrenched Interests Can Prepare. *The Journal of alternative investments*, *20*(3), 41-57.
113. Scheer, A. W. (2012). *ARIS—business process modeling*. Springer Science & Business Media.
114. Shan, L., Sangchoolie, B., Folkesson, P., Vinter, J., Schoitsch, E., &Loiseaux, C. (2019, September). A survey on the applicability of safety, security and privacy standards in developing dependable systems. *In International Conference on Computer Safety, Reliability, and Security* (pp. 74-86). Springer, Cham.
115. Takeuchi, H., & Yamamoto, S. (2019). Business AI alignment modeling based on enterprise architecture. In *Intelligent Decision Technologies 2019* (pp. 155-165). Springer, Singapore.
116. Terho, T. (2018). *Artificial intelligence transformation and implementation frameworks* (Master's thesis).
117. Unhelkar, B., & Gonsalves, T. (2020). Enhancing Artificial Intelligence Decision Making Frameworks to Support Leadership During Business Disruptions. *IT Professional*, *22*(6), 59-66.

118. Valanarasu, M. R. (2019). Smart and secure IoT and AI integration framework for hospital environment. *J. ISMAC*, *1*(03), 172-179.

119. Vedel, J. B., Irwin, A., & Andersen, P. H. (2013). Externalizing research through adaptive frameworks. *Nature Reviews Drug Discovery*, *12*(10), 723-724.

120. Wang, D., Weisz, J. D., Muller, M., Ram, P., Geyer, W., Dugan, C., & Gray, A. (2019). Human-AI Collaboration in Data Science: Exploring Data Scientists' Perceptions of Automated AI. *Proceedings of the ACM on Human-Computer Interaction*, *3*(CSCW), 1-24.

121. Wang, X., Han, Y., Wang, C., Zhao, Q., Chen, X., & Chen, M. (2019). In-edge AI: Intelligent zing mobile edge computing, caching and communication by federated learning. *IEEE Network*, *33*(5), 156-165.

122. Wirtz, B. W. (2011). Business model management. *Design–Instrumente–Erfolgsfaktoren von Geschäftsmodellen*, *2*.

123. Xu, Y., Turunen, M., Ahokangas, P., Mäntymäki, M., &Heikkilä, J. (2018, June). Contextualized business model: The case of experiential environment and AI. In *Proceedings of the the 2nd Business Model Conference, Florence, Italy* (pp. 6-7).

124. Yoffie, D. B., Kind, L., &Shimol, D. B. (2016). Numenta: Inventing and (or) Commercializing AI.

125. Yorks, L., Rotatori, D., Sung, S., & Justice, S. (2020). Workplace reflection in the Age of AI: Materiality, technology, and machines. *Advances in Developing Human Resources*, 1523422320927299.

126. Zhang, X., Hu, L., Salimath, M., &Kuo, C. C. (2019). Developing evaluation frameworks for business models in China's rural markets. *Sustainability*, *11*(1), 118.

127. Zhiyang, L., & Zemin, W. (2020). AI Enabling Entrepreneurship: Comparison of Theoretical Frameworks. *Foreign Economics & Management*, *42*(12), 3-16.

128. Zhou, Z., Chen, X., Li, E., Zeng, L., Luo, K., & Zhang, J. (2019). Edge intelligence: Paving the last mile of artificial intelligence with edge computing. *Proceedings of the IEEE*, *107*(8), 1738-1762.

Figures

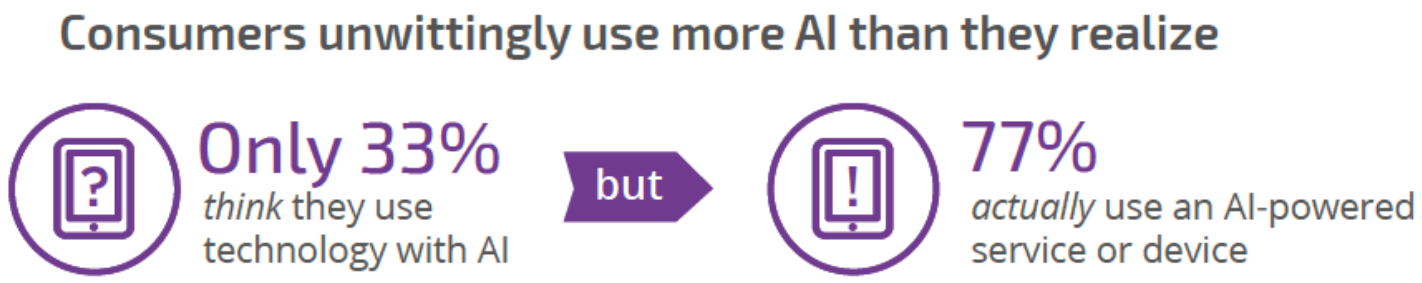

Figure 1

Consumers insight about the AI in business

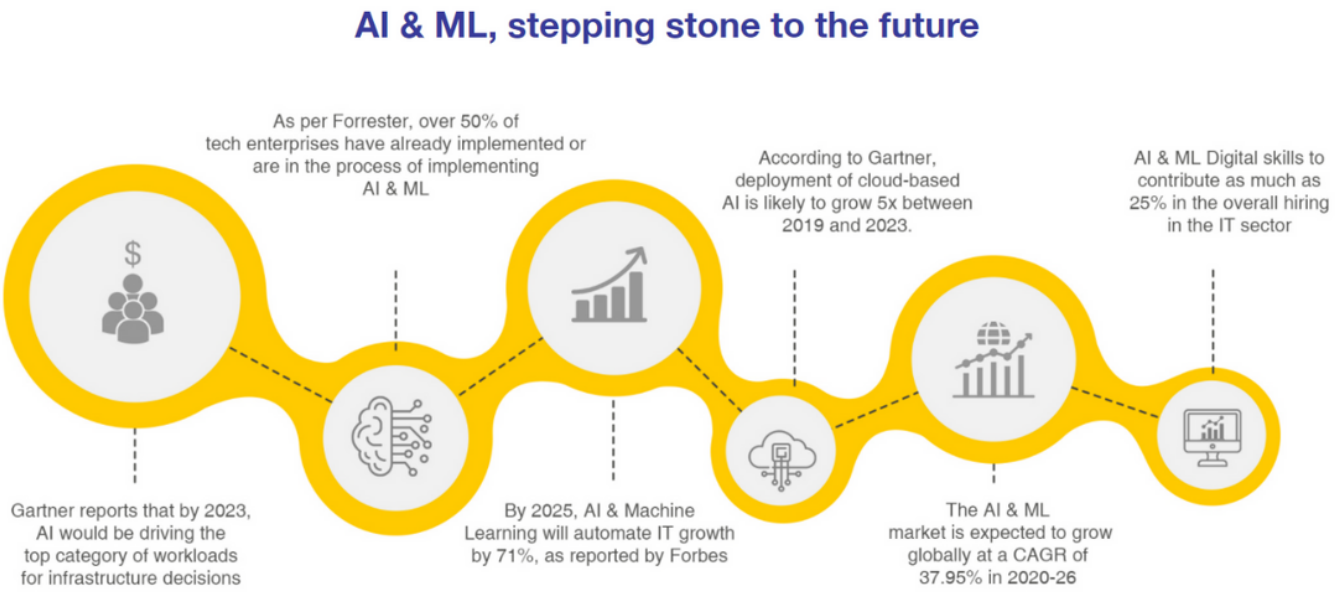

Figure 2

Stepping stone to the future of AI & ML in business ecosystem

Figure 3

Work flow

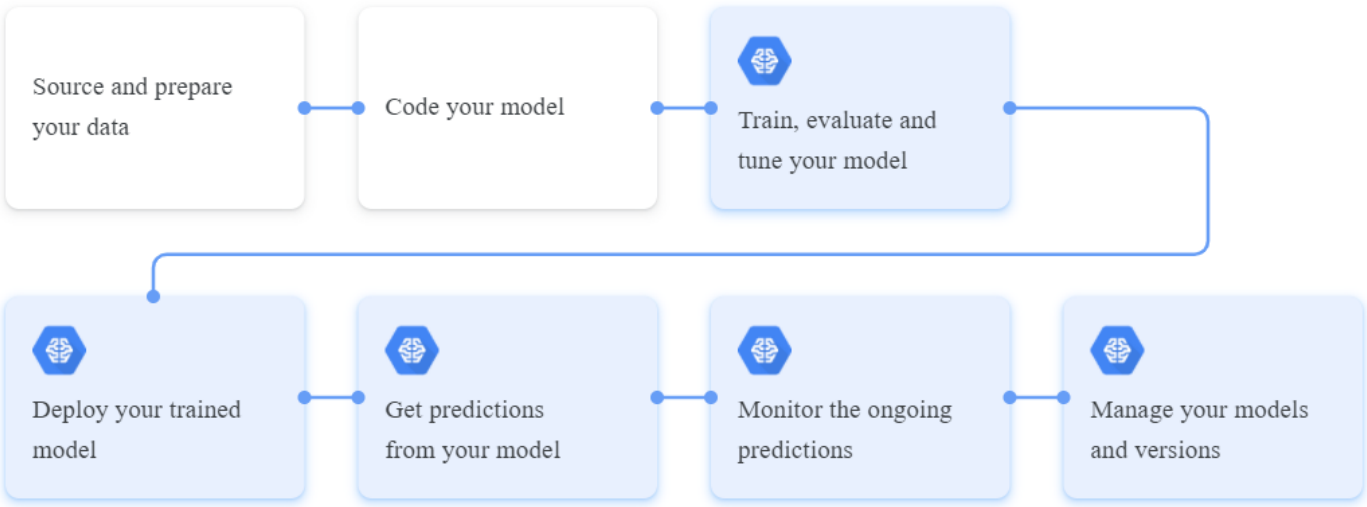

Figure 4

AIwork flow framework for Business Model

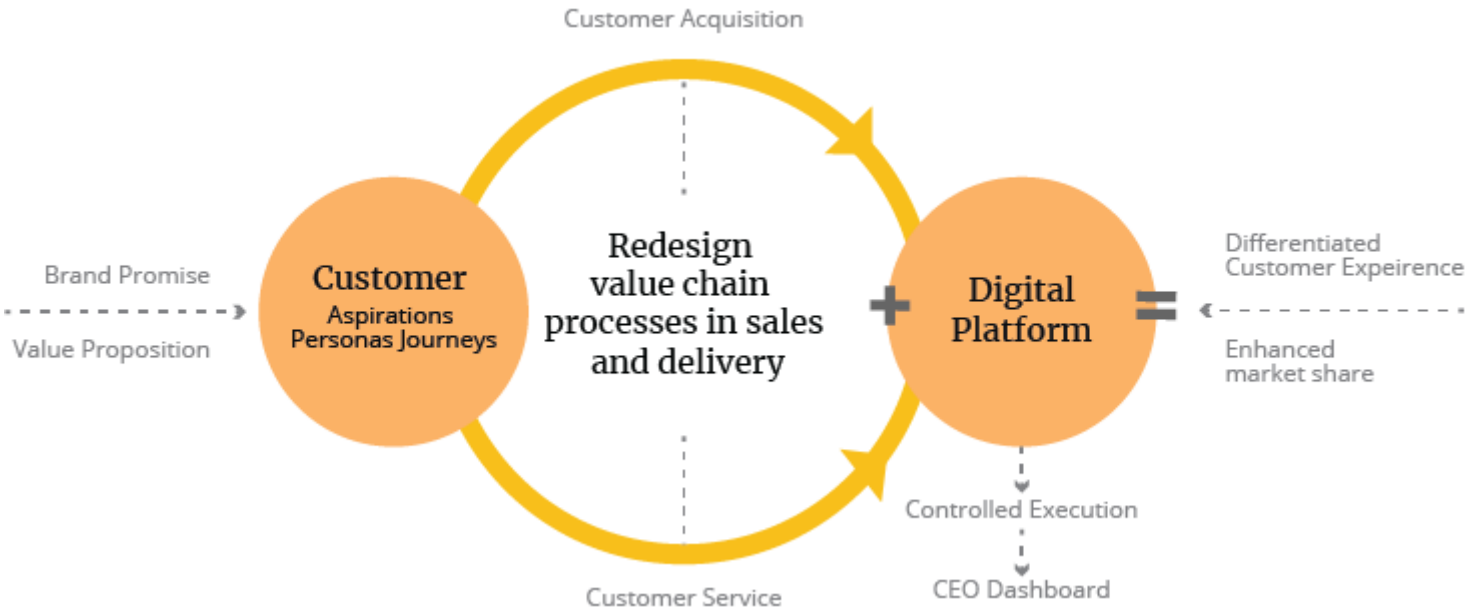

Figure 5

Digital Platform Framework

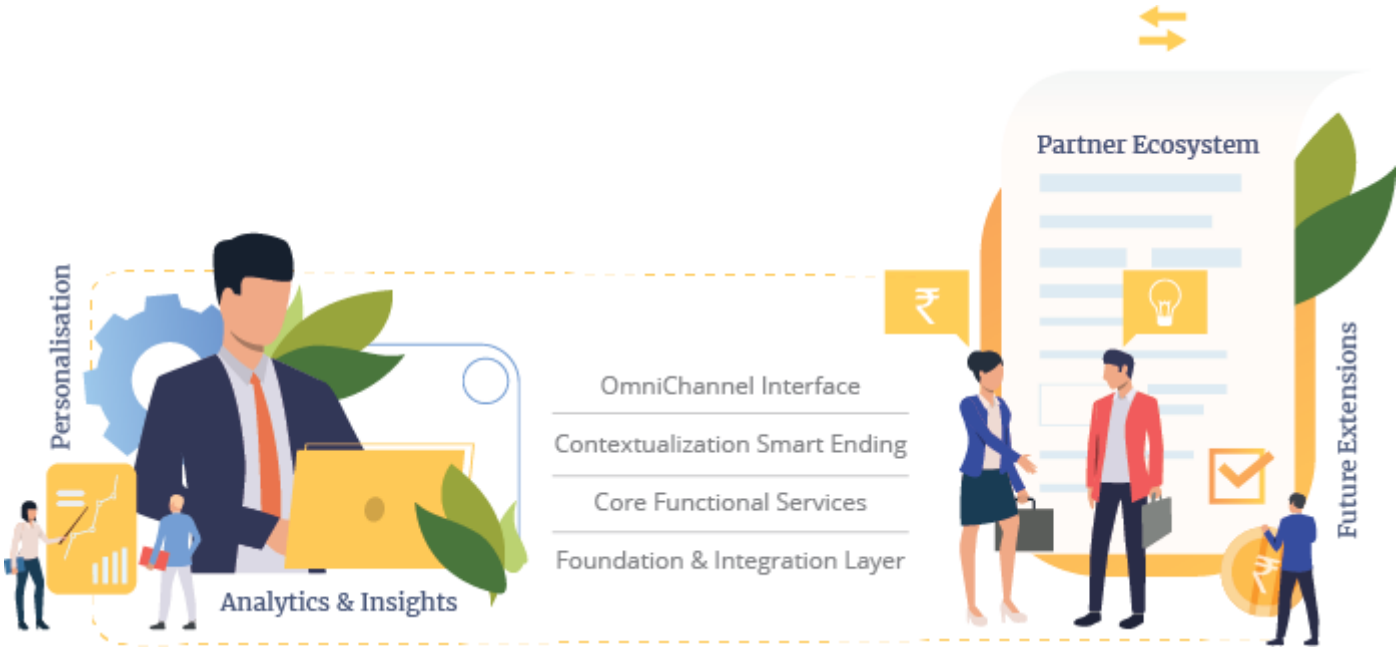

Figure 6

Workflow for AI-platform strategy framework

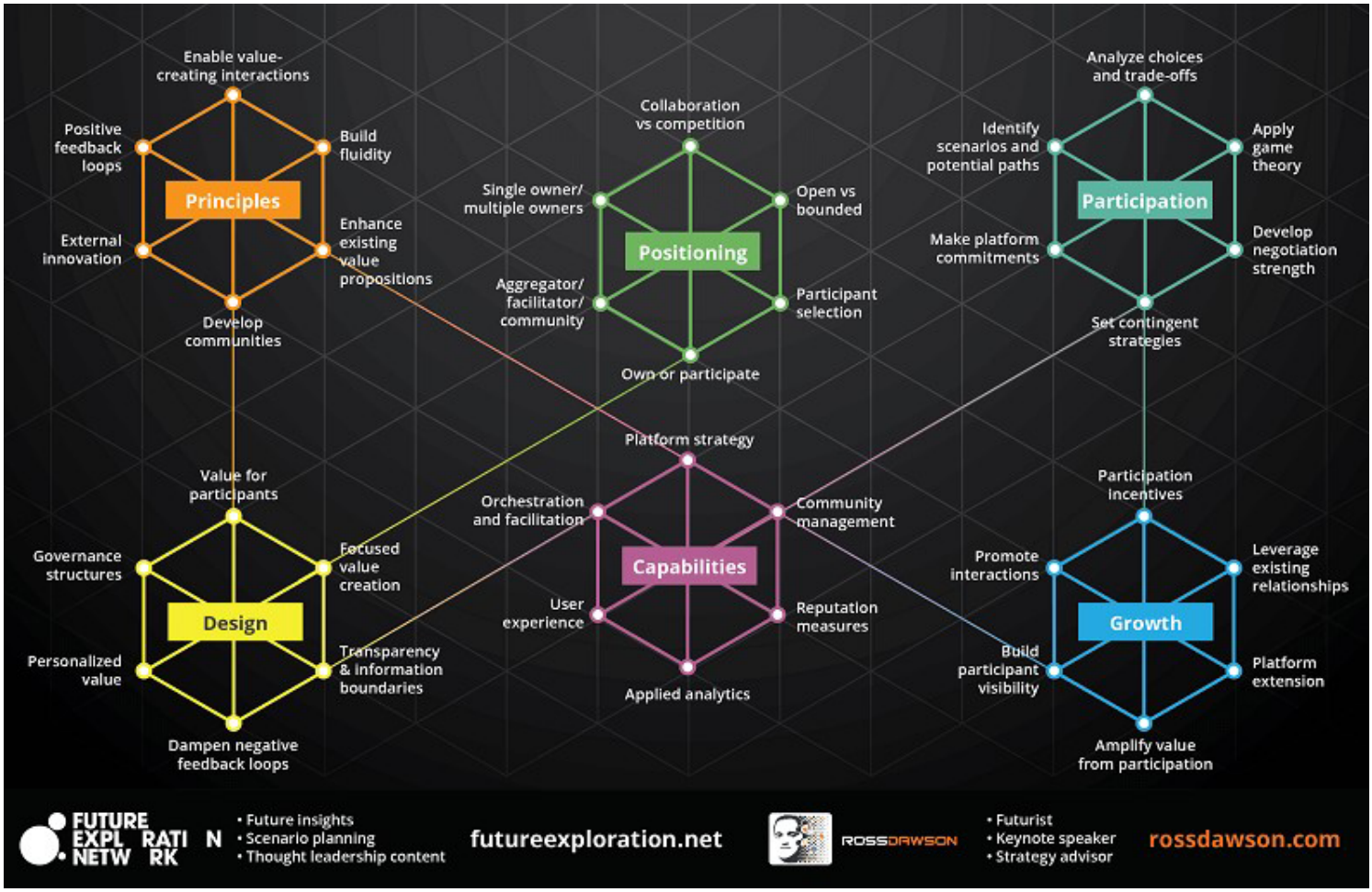

Figure 7

Digital Platform Strategy

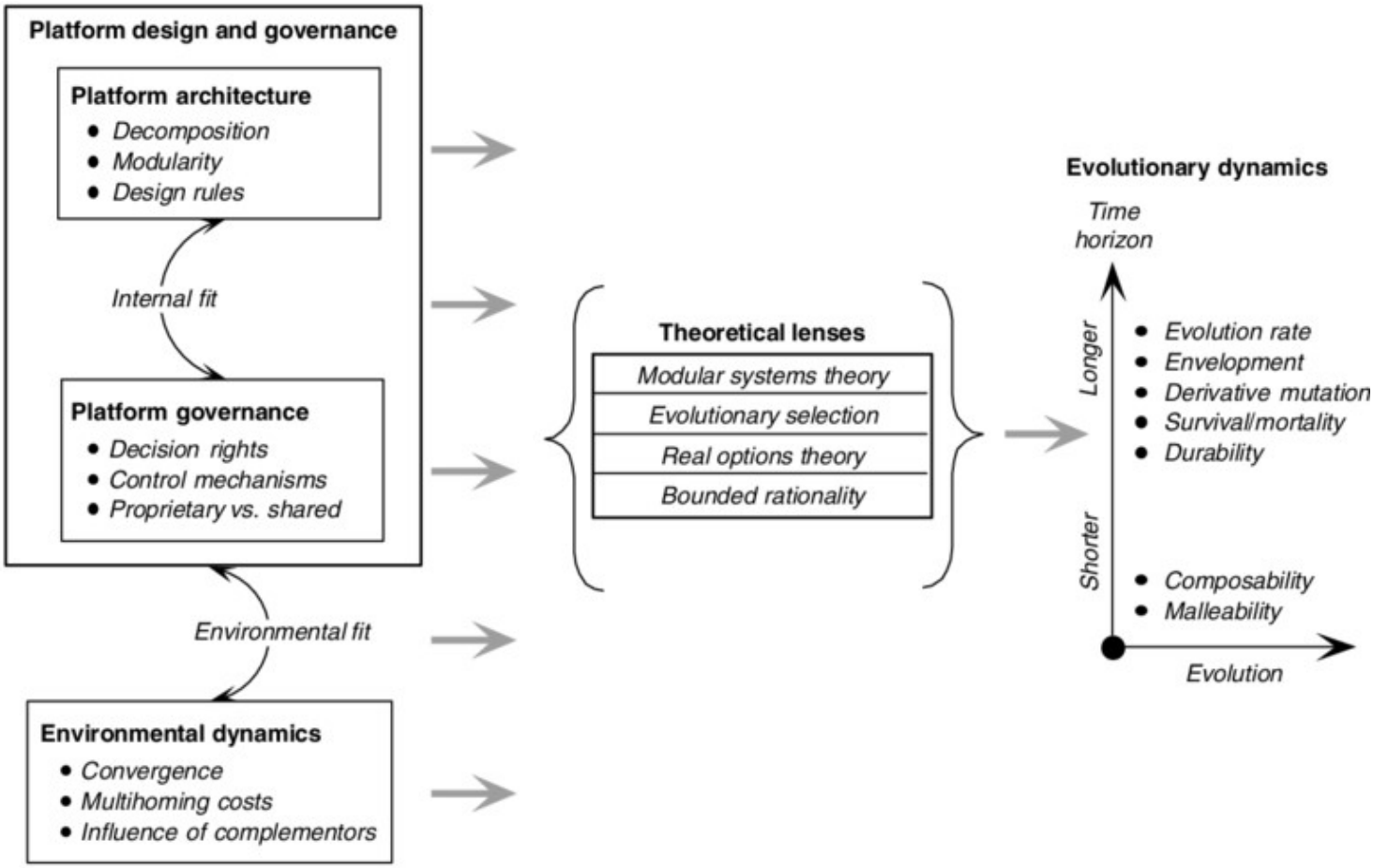

Figure 8

Platform Design and Governance

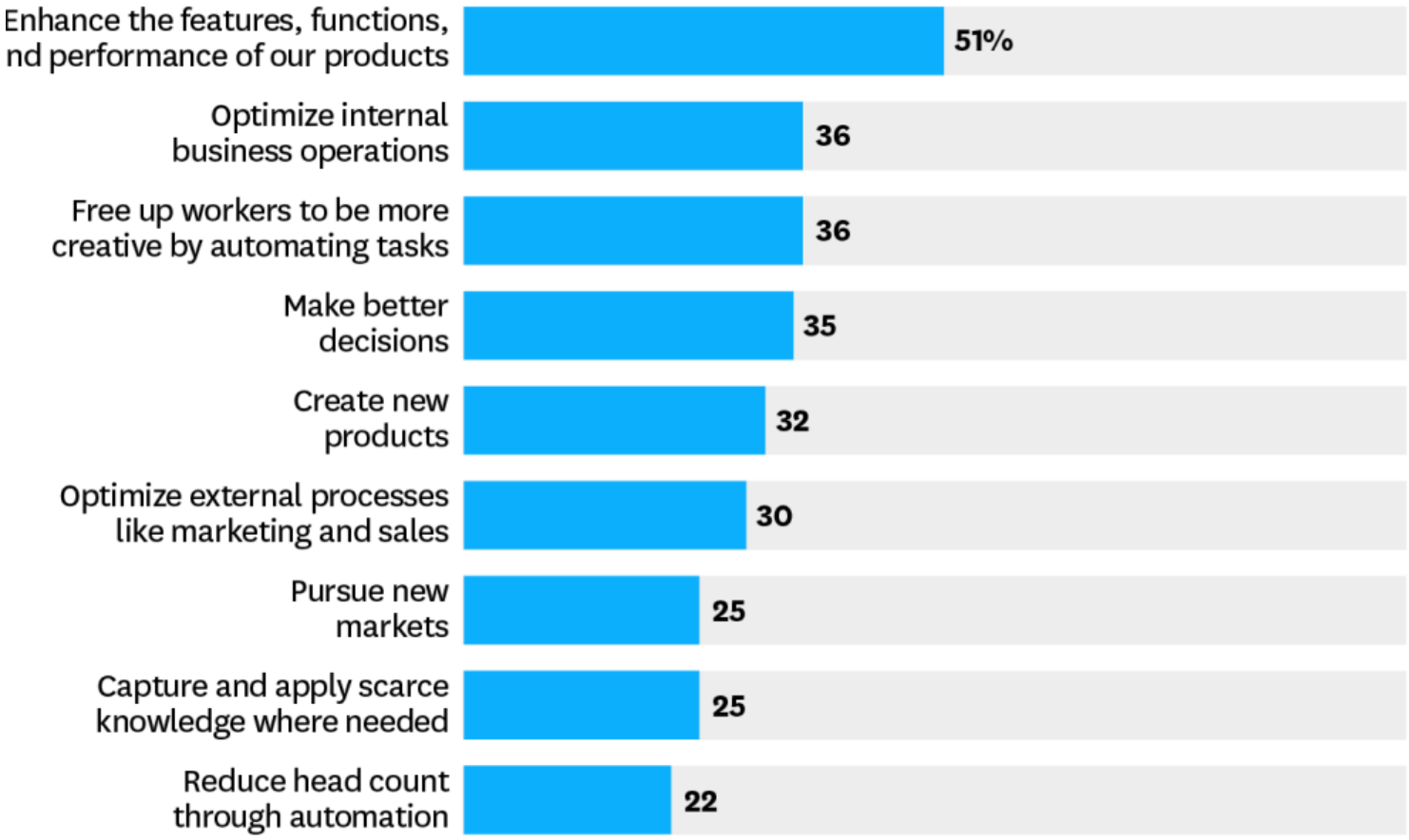

Figure 9

Percentage of Executives who cite the benefits of AI