Artificial Intelligence and Machine Learning
Survey Analysis

Contents

Introduction

According to the Organization for Economic Co-operation and Development, "Artificial intelligence (AI) systems are machine-based systems with varying levels of autonomy that can, for a given set of human-defined objectives, make predictions, recommendations or decisions. AI techniques are increasingly using massive amounts of alternative data sources and data analytics referred to as 'big data'. Such data feed machine learning (ML) models which use such data to learn and improve predictability and performance automatically through experience and data, without being programmed to do so by humans."

Artificial intelligence and machine learning (AI/ML) are on a rapid trajectory to growth and have proven industry-wide acceptance and uptake. To maintain market competitiveness, regulatory objectives should focus on maintaining market integrity, economic stability, and consumer protection whilst enabling the widespread consumption of emerging trends like the disruption of AI/ML. Thus, the streamlining of compliance processes within financial innovation contexts can improve existing procedures and cater to efficient workflows.

Moreover, there are currently no international guidance and standards on AI & ML specifically in the context of financial services. Thereby, the Central Bank of Bahrain collaborated with the Israeli Securities Authority and the Ontario Securities Commission to underline the matureness of the adoption and regulation surrounding AI/ML initiatives across different jurisdictions by circulating a survey to the GFIN (Global Financial Innovation Network) with a list of curated questions aimed at understanding global AI/ML literacy and subsequent governance. Hence, the survey scoped out the current trends of AI/ML in financial services within the respective jurisdictions of GFIN members, explored the treatment of these technologies by financial regulators, and induced an outlook from a regulator's perspective.

The survey was circulated to 30 GFIN members, which included: monetary authorities, securities commissions, central banks, insurance authorities, commodity commissions, and pension regulators. The survey included a list of questions categorized into two main sections, with one section focusing on the use of AI/ML technologies by regulators, hence exploring the matureness of setting adequate and comprehensive governance protocols that adhere to innovative solution offerings, whilst the other section focusing on the use AI/ML by regulated entities, hence the adoption of AI/ML solutions by the wider industry.

The following paper will provide insight into the circulated survey by analyzing the responses provided by participating members, thereby exploring the use of AI/ML across different jurisdictions. This, we believe, will help the GFIN network better understand the level of adoption on a global scale and the stance regulators take when it comes to innovative offerings. By deploying a risk-reward context, regulators are careful to adopt disruptors and ensure weighing their associated risks with their rewarding benefits within their respective jurisdictions.

The Industry's Perspective

The following section examines the survey questions directed towards regulated financial entities and analyzes the adoption of AI/ML technologies by financial institutions, hence providing industry insight on the application and use of AI&ML technologies.
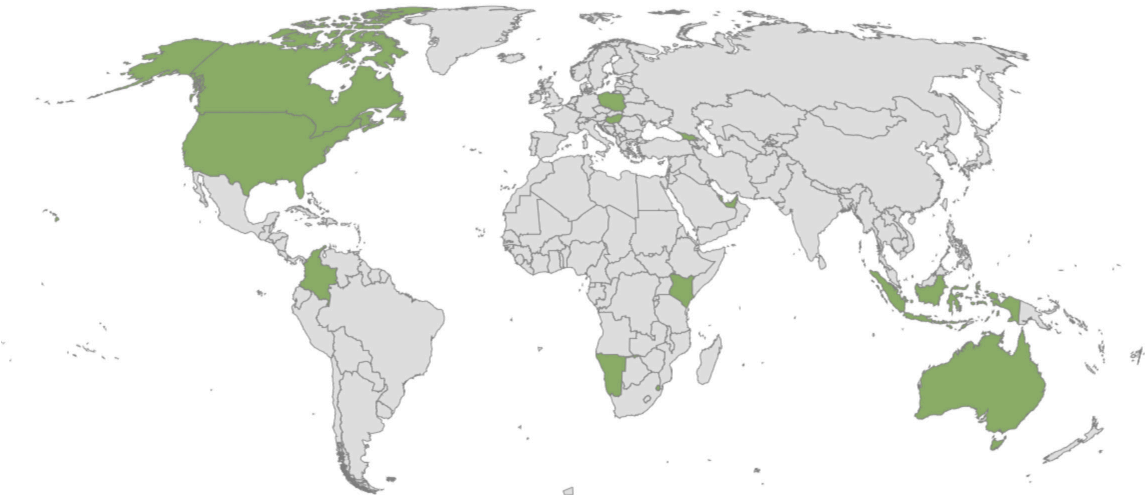
Are the authorized financial service providers in your jurisdiction currently using AI/ML?

Availability
■ Yes
■ No
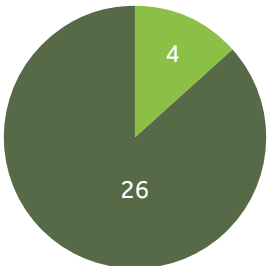
Around 86% of respondents confirmed having authorized financial service providers deploying AI/ML solutions within their jurisdictions. Hence, the majority have already delved into this technology and dispersed it within their entities, signifying a major uptake and appetite for the use of advanced technologies. It is important to note that the survey refers to strictly authorized financial entities.

If Yes, in which fields within the financial ecosystem do the authorized financial service providers in your jurisdiction use AI/ML technologies?

AI/ML Adoption schemes
- Algorithmic Trading
- Robo Trading
- Open Finance
- Issuers
- Asset Management
- Credit Intermediaries
- Other
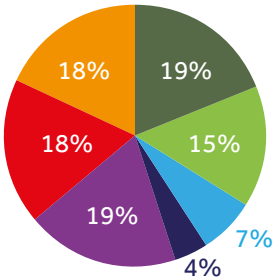
The survey responses elucidate the fact that the adoption of AI/ML technologies in financial services may introduce a plethora of business models and industry-wide use cases. Given that most of the respondents of the survey are securities regulators, the most common use cases highlighted include asset management and algorithmic trading. This proves that AI/ML has the potential to help in predicting investment patterns, forecasting asset performance, and gauging capital market movements, thus it can be a utility for asset managers to remain competitive. A common example is the use of predictive analysis to enhance existing customer relationship management procedures, hence, AI techniques can advise asset managers on the next best step to take based on the current situation, improving decision-making. Likewise, algorithmic trading shared the same popularity, scoring among the highest adoption schemes.

Respondents shared several alternative use cases adopted by their authorized financial service providers which go beyond the list of use cases outlined in the survey.

Those included the following:

1. Surveillance
2. Fraud detection (AML/CFT monitoring)
3. InusrTech (Automating underwriting)
4. Risk monitoring (risk modeling)
5. E-KYC (onboarding automation)
6. Compliance management
7. Customer engagement (chatbots/virtual assistants)

If Yes, to the best of your estimation, how many authorized financial service providers use AI/ML technologies?
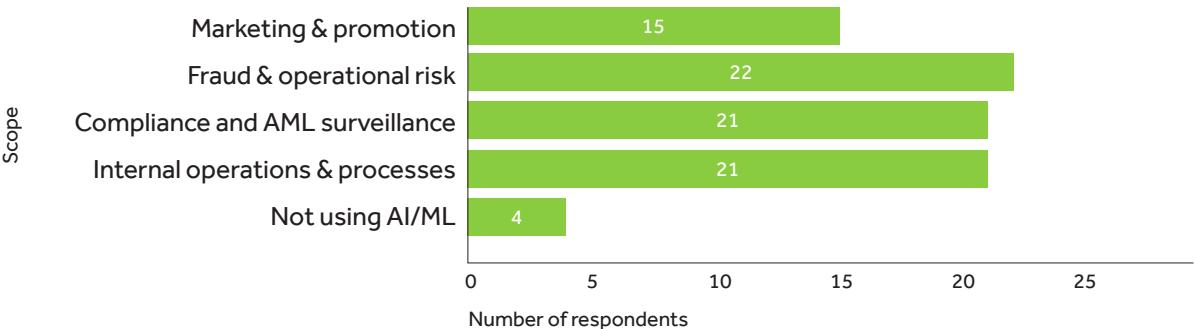
Adoption %
- ◼ Up to 33%
- ◼ Up to 50%
- ◼ Up to 75%
- ◼ More than 75%
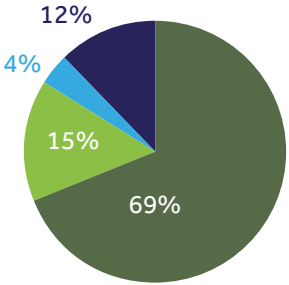
The diagram above is based on the 26 respondents that responded YES to having authorized financial service providers using AI/ML. Most of the respondents claim to have up to 33% of their financial service providers using AI/ML. This is a sufficient percentage of the market for a relatively new technology, signifying the wide acceptance and desire for its deployment and integration across sectors and targeting different corporate workflows. Likewise, its increased uptake maintains an adequate geographic distribution as three countries from different continents (each) marked a more than 75% market share. Thus, it becomes apparent that AI/ML's increased uptake is not geographically clustered but spans different regions of the globe, further denoting its popularity.

Are the authorized financial service providers in your jurisdiction currently using AI/ML for any of the following purposes?

As depicted by the graph on the previous page, the survey responses illustrate substantial adoption of AI/ML by authorized financial services providers for internal procedures focusing on enhancing existing workflows. This includes the use of AI/ML for different business functions such as automated decision-making, predictive analysis, portfolio management/investment research, as well as specific corporate values such as ESG and CSR, in which different AI/ML technologies can be used to not only implement the agendas but to ensure that it does so in a reliable and sustainable manner. The two most common use cases fall under the risk management and supervisory paradigm of an organization, hence fraud control, compliance management, and AML surveillance scored among the highest purposes, and all serve a common underlying principle, mitigating organizational risk. AI/ML plays a significant role in risk management in which intelligent techniques such as anomaly detection and threat correlation are implemented within existing risk management frameworks, making the execution of this strategy within an organization more efficient with minimized human errors associated with wrongful threat detections.

Likewise, marketing and promotion scored the lowest, among the adoption use cases, denoting a greater priority to secure an adequately functioning and profusely protected organization over associating with external affairs and placing dominance over increased brand recognition and higher sales. This analogy indicates that enterprises today place pivotal value on maintaining secure and adequate internal workflows and security governance protocols and are willing to use AI/ML to improve existing procedures to further enhance their efforts and maximize return benefits. Hence, organizations place greater importance on having a reliable internal system before reverting to marketing and promotional agendas, ultimately helping build a more ethical ground for future and existing corporations.

In your opinion, what are the main barriers in your jurisdiction for authorized financial service providers to use AI/ML?
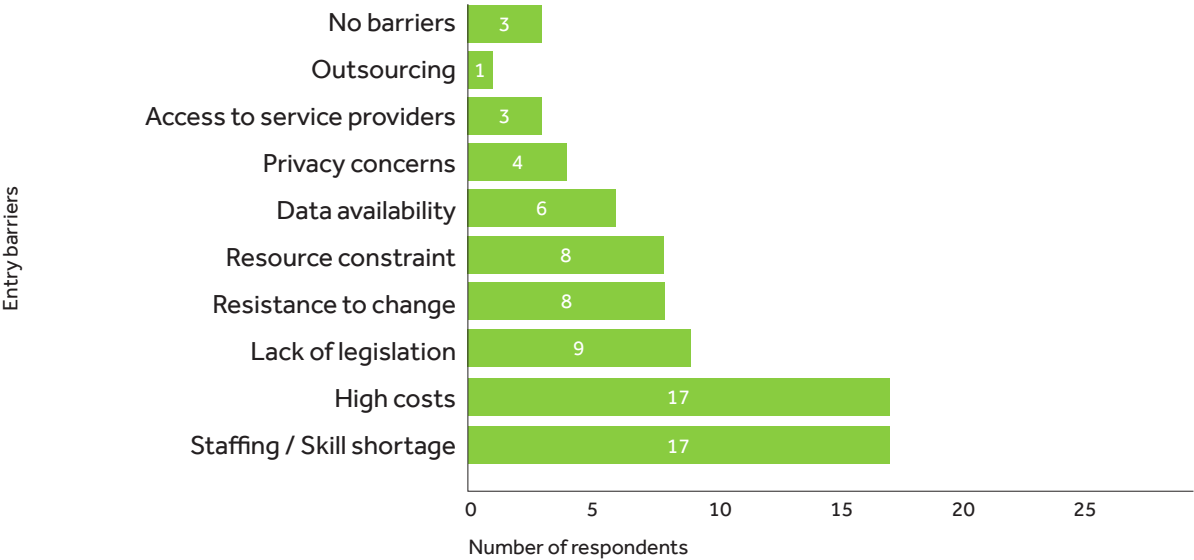
This part of the survey aims to discover the common impediments facing financial entities within their respective jurisdictions in terms of adopting AI/ML solutions. As illustrated by the graph above, three countries reported having no barriers. The remaining respondents outlined a wide range of interdependent barriers classified and illustrated in the graph above, with the most commonly reported barrier being associated with a lack of adequate funding due to the high costs of implementation. A staggering 17 respondents indicated having this barrier deciphering a major progression obstacle hurdling the adoption capacity worldwide. The study found that lack of funding is a common issue that correlates with some of the remaining barriers such as resource constraint, of which 8 respondents confirmed having, where a lack of capital limits a firm's ability in funding infrastructure requirements to implement AI/ML solutions.

Likewise, almost 30% of respondents reported resistance to organizational change due to having adequate traditional systems. Hence, firms may find it difficult in deriving the value of AI/ML and likely justifying the necessary funds required to operate it. This resistance to change is also associated with a lack of trust in AI/ML, hence firms find that depending on AI techniques such as predictive analysis and automated-decision making is very risky, and the costs associated with its failure are extremely high.

This risk is partially depicted within the Privacy concerns barrier pillar in which 4 respondents reported data protection challenges associated with its potential misuse, especially the security of personally identifiable data can prove to bear profound costs to an organization. This is especially because the availability of quality data is an integral part of AI/ML implementation. Being a data-driven technology, it is crucial to have a sufficient flow of data to operate those technologies, another common barrier reported by roughly 22% of respondents.

Similarly, members also indicated the hesitancy of some firms in adopting new tools that have not demonstrated market efficiency for a considerable amount of time. This outlines a general lack of understanding of AI/ML, which can be seen within the Staffing/Skill and Lack of regulation barrier. The Staffing/Skill barrier scored among the highest, with almost 62% of members confirming its presence, indicating a major lack of appropriate talent (data scientists/data engineers) necessary to operate those technologies. Despite its minimized human input paradigm, AI/ML still requires skilled labor within its product lifecycle from development to obsolescence. Likewise, this lack of understanding is similarly depicted within the lack of regulation barrier, in which almost 33% of members reported a shortage in appropriate legislation and regulations governing the development and adoption of AI/ML solutions within their respective jurisdictions. A vital component to the successful dispersion of AI/ML within any region.

Moreover, despite having all the barrier pillars correlated and interdependent, the foundation that indirectly stimulates those barriers is the lack of competent understanding of AI/ML technologies, hence AI/ML literacy enables a firm or jurisdiction to decipher its value, justify its costs, support its governance, and effectively deploy and reap its benefits.

From your supervisory experience, which of the following business areas would benefit the most from AI/ML for your authorised financial service providers?
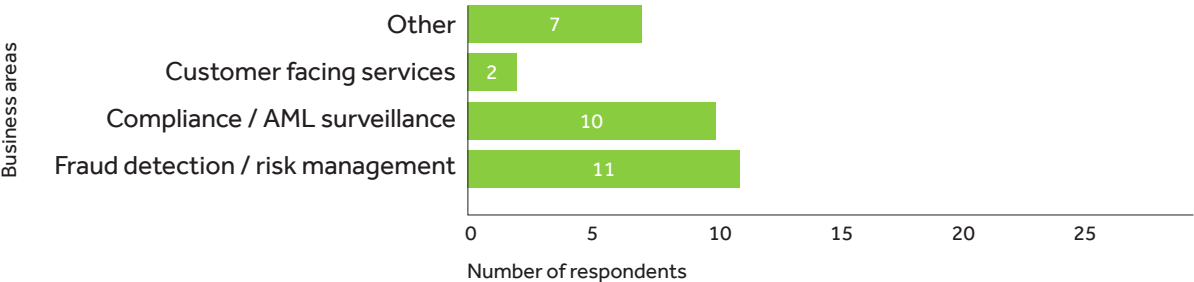
This part of the survey further adds to the previous question concerning adoption use cases/purposes which denoted a greater significance placed upon surveillance implementation schemes falling under the risk management paradigm. Hence, this question delves deeper into the precise implementation measures falling under the supervisory scope. Hence, compliance/AML surveillance and fraud detection/risk management scored among the highest, averaging 36% and 33% respectively. This denotes the key role AI/ML technologies play in the overarching internal and external enterprise governance protocol. Automated decision-making programmed to execute when a specified criterion is met is a common technique utilized in AML and anti-fraud systems dependent on AI/ML. Further, roughly 6% of respondents claimed to utilize it for customer-facing services which can include chatbots and virtual assistants utilized to maintain an organization's customer excellency and quality assurance. Hence, a virtual assistant can help a customer freeze their card immediately when detecting suspicious behavior, contributing to safeguarding the organization and its clients from fraudulent activity.

Likewise, around 23% of members reported having other use cases that would benefit the most from AI/ML which include the following;

1.   Marketing/promotion
2.   Product design and innovation
3.   Robo-advisory and investment trading

The Regulator's Perspective

Most of the regulators (60%) don't use AI & ML in their continuous supervision. However, a considerable number of regulators (40%) use AI & ML and this rate is expected to increase in the future.

### The use of AI & ML in the regulators' continuous supervision

■ No
■ Yes

Among the securities authorities, most of them (55%) use AI & ML in their continuous supervision. In this context, from the survey results it can be said that the securities industry is the most dominant user of AI & ML (out of all respondents from the various fields; see section 3 below).

In-house of third parties' development of AI & ML systems or applications

Out of the 12 regulators that use AI & ML, 6 responded that they developed the AI & ML systems or applications in-house, while 4 regulators responded they used third party service providers. 2 out of the 12 regulators that use AI & ML responded that they use both in-house and third-party service providers for the development of AI&ML systems or applications. Overall, only a 1/3 of the survey respondents confirm their adoption of AI/ML technologies within their respective jurisdictions, a small and inconclusive figure that may not suffice in representing the wider adoption scale and the appropriate analysis. Thus, survey analysis indicates that most jurisdictions are at an early stage when it comes to delving into the dispersion of AI/ML technologies and are yet to gain a competent understanding that will enable them to safely deploy and regulate it.

AI & ML systems or applications development by the regulator or through a third-party

■ By the regulator
■ through a third party
■ both - by a regulator
   and through a third party
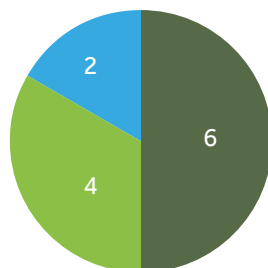
89% of the regulators that declared they do not use AI & ML (16 out of 18) answered that the use of AI & ML technologies is a part of their strategic plan for the near future (coming 3 years). The rest 11% (2 out of 18) stated that the use of AI & ML technologies isn't a part of their strategic plan for the near future (coming 3 years), but part of their long-term strategic plan (5-10 years).

Regulation

12 out of 30 (40%) respondents answered that laws/regulations/rules regarding AI & ML technologies are already in place in their jurisdictions. 9 out of these 12 regulators responded that they issued guidelines with respect to AI & ML.

■ Yes
■ No
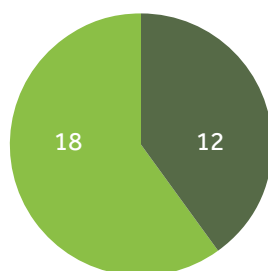
It is possible that in light of the growing trend in the use of AI&ML in the financial fields, led to the publication of such guidelines. Another conclusion might be that the adoption of AI&ML regulations by the legislator makes it easier and more convenient (even from a practical or political standpoint) for the regulators to publish guidelines in this regard.

Yet, it should be noted that the survey did not examine whether the financial regulators in jurisdictions that did not issue laws/regulations regarding AI & ML technologies had issued guidelines in these matters, an issue that may contradict this view.

18 respondents said they don't have any regulation regarding AI & ML technologies. However, 6 of them said they and the authorized financial service providers in their jurisdictions use AI & ML technologies, and as so 8 of them said only the authorized financial service providers in their jurisdictions use AI & ML technologies.

83% of the regulators that don't regulate AI & ML technologies in their jurisdictions (15 out of 18), believe that the use of AI & ML should be regulated, mostly by existing laws or\and general ones and be technology neutral.

To conclude, most regulators don't use AI & ML in their continuous supervision but intend to use AI&ML technologies as part of their strategic plan for the near future. In contrast, the use of AI by financial regulated entities is much broader, and our expectation is that the number will continue to rise. Given this situation, it is not surprising that the majority of the regulators believe that AI & ML should be regulated.

Path forward

The use of AI/ML globally has accelerated[2], and AI/ML solutions have the potential to significantly change the financial services industry in the near future. Despite the recent public attention related to chatbots, AI/ML is seen as an opportunity to free up resources to focus on more cognitive aspects. [3] While there are risks associated with AI, there are also benefits that can improve consumer protection and facilitate competitive financial services.

Our survey results provided a useful overview of global approaches to the use of AI/ML solutions by financial service providers and regulators. The survey found that the vast majority of respondents that are financial service providers already use AI/ML solutions within their respective jurisdictions. Based on the survey, the most common AI/ML use cases for market participants are related to risk management, compliance and AML surveillance, and internal operations and processes. However, common barriers associated with adopting AI/ML solutions include the lack of adequate funding and technologists capable of implementing these solutions. Similarly, the majority of regulators from the diverse membership of GFIN that responded to the survey do not currently use AI/ML solutions for continuous supervision, but many respondents expect their use of AI/ML to increase over time.

Most respondents do not currently have regulations addressing the use of AI/ML technologies. However, it is anticipated that more regulators will publish either regulations or guidelines in the future while trying to find the right balance between principles, guidelines, and/or regulation that is specific enough to be helpful while remaining broad enough to be adaptable to technological advancement. At the same time, regulators may also need to consider implementing new frameworks and tools to address the risks and benefits of AI/ML.[4]

To support GFIN members addressing this, we are planning two distinct working group streams:

Stream 1: Focus on use of AI/ML by regulators
Stream 2: Focus on use AI/ML by regulated entities

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1   Chui, M. et al. (2022) The state of AI in 2022 - and a half decade in Review, McKinsey & Company, Accessed: February 9, 2023.
2   IOSCO (2021) The use of artificial intelligence and machine learning by market intermediaries and asset managers, The International Organization of Securities Commissions, IOSCO FR06/2021
3   (2022) Adopt, Innovate, Regulate: Emerging Solutions for the Use of AI in Financial Services, Schwartz Reisman Institute for Technology and Society, Accessed: February 9, 2023.

We are currently contemplating the following next steps for the GFIN AI/ML Working Group:

- Collect and share current leading practices for AI/ML adoption within regulators and/or regulated entities

- Develop and share guidance for AI/ML adoption within regulators and/or for regulated entities

- Organize webinars or workshops, themes could include:

    - A Regulator in the Spotlight (e.g., leading practices from selected jurisdictions, overview of guidance issued on AI/ML to get different perspectives)

    - Insights from think tanks or research centers (e.g., Ethical/Responsible use of AI, Interpretability, or Explainability)

    - Third party solutions for financial services firms that utilize AI/ML

- Creation of Running List of current and potential future AI/ML use-cases in within financial services

- Creation of Running List of AI/ML tools to use or highlight to regulated entities (e.g., github links)

- TechSprint on development of AI/ML models useful for financial services regulators

- Continuous annual/semi-annual GFIN AI/ML survey to allow for comparison to previous year and understand trends, including potentially increase in maturity

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