The Research Analytics ISSN (Online): 3107-6165
Volume 2, Issue 1, April-June 2026 pp. 1-7

The Research Analytics
(A Peer Reviewed, Indexed and Open Access Journal)

1

The Economic Impact of Artificial Intelligence Across Multidisciplinary Sectors: A Comparative Study

Dr. Akash Kishor Gavhane

Assistance Professor, Pratap College (Autonomous), Amalner Dist. Jalgaon, Email. akash.gavhane2712@gmail.com

Abstract

The rapid integration of Artificial Intelligence (AI) across diverse multidisciplinary sectors has fundamentally altered traditional economic paradigms, necessitating a comprehensive comparative analysis of its impacts. This study investigates the economic transformations driven by AI architectures, contrasting their deployment in sectors such as healthcare, finance, and autonomous decision making environments. By proposing a novel Multidisciplinary Economic Impact Assessment Framework (MEIAF), this study models the financial and operational efficiencies gained through AI driven sequential decision making and creative problem solving. Furthermore, this is study paper outlines a hypothetical evaluation methodology utilizing an Indian data topic of research to contextualize the framework within a rapidly developing digital economy. Ultimately, this study provides a synthesized perspective on how integrating AI alters microeconomic foundations, demanding new frameworks for ethical governance and cross sector deployment.

Keywords: *artificial intelligence, oeconomic theory, emultidisciplinary sectors, healthcare economics ,texplainablecare Economidigital economy.AI, Indian Digital Economy*

Introduction

The advent of modern artificial intelligence has precipitated a paradigm shift across a myriad of disciplines, deeply influencing engineering, social sciences, and foundational economics. Historically, economic modeling relied on the assumption of human rationality; however, the deployment of intelligent computational techniques inspired by natural intelligence has introduced entirely new variables into the mechanics of demand, supply, and rational choice (Marwala and Hurwitz 2017). As AI agents become increasingly capable of executing complex probability judgments and dynamic planning, they are no longer merely tools for automation but active participants in economic ecosystems. This evolution requires a rigorous examination of how AI technologies yield distinct economic impacts when applied to varying

The Research Analytics ISSN (Online): 3107-6165
Volume 2, Issue 1, April-June 2026

multidisciplinary sectors, ranging from clinical healthcare environments to macroeconomic forecasting.

The primary problem addressed in this paper is the fragmentation of AI economic impact assessments, which are typically siloed within individual disciplines without a unifying comparative framework. The scope of this study encompasses a comparative analysis of AI's economic utility in healthcare specifically through simulated clinical decision making and general economic theory, evaluating how autonomous agents interact with market dynamics under uncertainty. By examining both the operational cost reductions and the systemic complexities introduced by AI, this research aims to delineate the overarching economic footprint of intelligent systems. This broader perspective is crucial for policymakers and industry leaders who must allocate resources effectively across intersecting domains.

Existing approaches to evaluating the economic impact of AI remain insufficient for several compelling reasons. First, traditional economic theories and evaluation frameworks fail to account for the bounded rationality and creative problem solving capabilities of modern AI systems, treating them as conventional capital rather than adaptive, decision making a2017; Gizziala and Hurwitz 2017) (Gizzi et al. 2022). Second, prevailing methodologies largely consist of isolated, sector specific studies that ignore the cross sector synergies and shared theoretical dimensions such as those seen in neurosymbolic integration that drive broader macroeconomic transformations (Marra et al. 2021). Without a multidisciplinary lens, current models cannot accurately capture the cascading economic consequences of AI deployment, leading to misaligned investment strategies and regulatory blind spots.

To bridge these critical gaps in the literature, this paper makes the following structured contributions:

- We propose the Multidisciplinary Economic Impact Assessment Framework (MEIAF), a novel approach that synergizes Markov decision processes with updated macroeconomic theories to evaluate AI's cross sector financial utility.
- We design an evaluation methodology centered on a hypothetical Indian data topic of research, providing a blueprint for assessing AI's economic impact within the context of a rapidly scaling, data rich developing economy.

Related Work (Review of Literature)

AI in Economic Theories and Probability Judgment

The intersection of artificial intelligence and formal economic theory has catalyzed a reevaluation of classical market models. Core to this category is the exploration of how computational techniques impact fundamental economic concepts such as demand and supply, asymmetrical information, and rational choice (Marwala and Hurwitz 2017). Furthermore, decision making in these updated models relies heavily on sophisticated probability judgments, balancing Bayesian theories with the theory of belief functions to navigate uncertainty (Shafer 2013). The primary strength of this literature lies in its ability to adapt classical economics to the realities of algorithmic trading and automated resource allocation. However, a notable weakness is that many of these updated economic models remain highly theoretical, lacking

The Research Analytics ISSN (Online): 3107-6165
Volume 2, Issue 1, April-June 2026

empirical grounding in physical, multidisciplinary deployment environments. Compared to these foundational economic studies, our work transitions from theoretical updates to applied comparative frameworks, explicitly measuring how these AI driven economic shifts manifest differently in distinct industrial sectors.

AI Frameworks and Explainability in Healthcare

A significant body of literature focuses on the integration and economic impact of AI within the healthcare sector, particularly regarding clinical decision making and diagnostic explainability. The core idea in this domain is the utilization of advanced computational frameworks, such as Markov Decision Processes (MDPs), to simulate clinical pathways, thereby exploring healthcare policies and optimizing treatment decisions over time (Bennett and Hauser 2013). Concurrently, the necessity for Explainable Artificial Intelligence (XAI) in healthcare has been heavily emphasized to ensure trust, safety, and legal compliance in medical diagnostics (Bharati et al. 2023). The strength of these sector specific models is their high fidelity to real world operational complexities and their direct implications for reducing healthcare costs. Conversely, their main weakness is their narrow scope, which often precludes the generalization of their economic findings to other industries. Our research builds upon these healthcare specific MDP and XAI models by integrating their operational cost saving metrics into a broader, multidisciplinary economic assessment framework.

Ethical Governance and Creative Problem Solving

The final category of related work addresses the governance, ethical principles, and adaptive capabilities of AI agents in dynamic environments. Literature in this area seeks to link various AI principles proposed by different organizations to create comprehensive frameworks for ethical development (Zeng et al. 2018). Additionally, research into Creative Problem Solving (CPS) emphasizes the need for autonomous systems to resolve off nominal or anomalous problems when deployed in unpredictable real world scenarios (Gizzi et al. 2022). The strength of this discourse is its proactive approach to the long term safety and socio economic integration of AI systems. However, a recurring weakness is the difficulty of quantifying the direct economic cost of ethical compliance and the financial benefits of CPS capabilities. This paper expands upon these concepts by incorporating the evaluation of AI safety principles and CPS into a structured economic pipeline, specifically examining how the helpfulness of XAI influences human decision making efficiency and subsequent economic outcomes (Labarta et al. 2024).

Method/Approach

Multidisciplinary Economic Impact Assessment Framework (MEIAF)

To systematically evaluate the economic impact of artificial intelligence across various sectors, we introduce the Multidisciplinary Economic Impact Assessment Framework (MEIAF). This framework is designed to capture both the micro level operational efficiencies and the macro level economic paradigm shifts induced by AI deployment. The MEIAF operates through a structured, three step pipeline:

The Research Analytics ISSN (Online): 3107-6165
Volume 2, Issue 1, April-June 2026

(1) Sector Specific Simulation, (2) Economic Utility Mapping, and (3) Cross Sector Comparative Analysis. By abstracting the complex interactions of intelligent systems into quantifiable economic metrics, the MEIAF allows researchers to evaluate how different AI architectures ranging from statistical relational AI to neurosymbolic systems—affect resource allocation and productivity (Marra et al. 2021). The approach inherently assumes that AI operates as an active economic agent, heavily influencing rational choice, pricing mechanisms, and market efficiency (Marwala and Hurwitz 2017).

The pipeline of the MEIAF is structured as follows to ensure rigorous and reproducible economic modeling:

1. **Sector Specific Simulation:** Utilizing Markov Decision Processes (MDPs) and dynamic decision networks to model sequential decision making environments. For instance, in healthcare, this module simulates alternative clinical paths and treatment policies, accommodating partially observable environments where data may be missing (Bennett and Hauser 2013).
2. **Economic Utility Mapping:** Translating the outcomes of the simulations into standard economic metrics. This involves updating traditional models of demand, supply, and bounded rationality to account for the efficiency, speed, and accuracy of the AI agents compared to human baselines (Marwala and Hurwitz 2017).
3. **Cross Sector Comparative Analysis:** Aggregating the mapped economic utilities from diverse sectors to identify overarching trends, cost saving synergies, and shared infrastructural requirements. This step also incorporates the evaluation of human AI trust, measuring how Explainable AI (XAI) impacts the speed and reliability of human decision making in these workflows (Labarta et al. 2024).

Design Choices and Rationale

The key design choices within the MEIAF are rooted in the necessity for robust, dynamic simulation and rigorous probability managemendecision processesf Markov Decision Processes for the simulation module is driven by their proven efficacy in modeling environments where outcomes are partly random and partly under the control of a decision maker, a critical feature in both clinical healthcare and financial markets (Bennett and Hauser 2013). Furthermore, the integration of multiple probability languages such as Bayesian theory and the Dempster Shafer theory of belief functions allows the framework to accurately model the subjective judgments and uncertainty inherent in complex expert systems (Shafer 2013). We also emphasize the inclusion of Creative Problem Solving (CPS) metrics because the economic viability of an autonomous system drops significantly if it fails to adapt to anomalous, off nominal problems post deployment (Gizzi et al. 2022).

Evaluation Plan: The Indian Data Topic of Research

To rigorously test the MEIAF, we propose an evaluation plan centered on a highly relevant emerging market context: an Indian data topic of research focusing ontelemedicinetion of rural tele medicine and digital microfinance. Due to the rapid digitization and immense population scale in India, it provides an ideal, high complexity environment for studying AI's

The Research Analytics ISSN (Online): 3107-6165
Volume 2, Issue 1, April-June 2026

multidisciplinary economic impact. We propose the generation and utilization of a hypothetical, large scale dataset tracking AI assisted diagnostic tools in Indian rural clinics alongside AI driven credit scoring for local micro enterprises.

The evaluation will be conducted by feeding this hypothetical Indian dataset into our MDP based simulation environment to measure projected healthcare cost reductions and financial default rate improvements. We will utestbedses and simulated test beds, which are recognized as ideal benchmarks for exploring AI techniques in dynamic and uncertain scenarios (Hu et al. 2023). By evaluating how the simulated AI models handle the unique constraints of the Indian data topic such as extreme data sparsity in rural regions and the need for high explainability among non expert users we can quantify the precise economic value of deploying neurosymbolic AI versus traditional statistical models in developing economies.

Discussion

Practical Implications and Deployment Considerations

The practical implications of the proposed MEIAF and its underlying findings are profound for both macroeconomic policy and industrial strategy. By recognizing artificial intelligence as an active agent that fundamentally updates traditional economic theories of rational expectation and asymmetrical information, organizations can more accurately forecast the return on investment for AI integrations (Marwala and Hurwitz 2017). In the healthcare sector, the deployment of AI fdecision processesg Markov Decision Processes can dramatically optimize treatment plans, leading to substantial cost reductions and better resource allocation in overburdened medical systems (Bennett and Hauser 2013). However, successful deployment requires careful consideration of the operational environment, dictating that AI platforms must provide clear, context dependent explanations to ensure that human operators can seamlessly integrate AI insights into their daily workflows (Labarta et al. 2024).

Limitations and Failure Modes

Despite the robust theoretical foundation of this study, several limitations and failure modes must be acknowledged regarding the deployment of AI in multidisciplinary economic contexts.

- **Data Scarcity and Quality:** In many emerging markets, including scenarios explored in our proposed Indian data topic of research, the lack of clean, annotated data can cause severe brittleness in AI models, leading to skewed probability judgments and suboptimal economic decisions (Shafer 2013).
- **Simulation vs. Reality Gap:** While games and simulation envirtestbedserve as excellent test beds for AI research, they often fail to capture the full spectrum of irrablack swanan behaviors and black swan events present in real world economic and healthcare systems (Hu et al. 2023).
- **Explainability Trade offs:** There is often an inverse relationship between the performance of complex deep learning models and their explainability; a failure to adequately explain AI decisions in critical domains like medical diagnostics can lead

The Research Analytics ISSN (Online): 3107-6165
Volume 2, Issue 1, April-June 2026

to outright rejection by end users, negating any theoretical economic benefits (Bharati et al. 2023).

Ethical Considerations and Risks

The integration of AI into foundational economic and healthcare systems introduces critical ethical considerations that extend beyond simple technical performance. First, algorithmic bias poses a severe risk; if the AI systems used for resource allocation or clinical decision making are trained on biased historical data, they may perpetuate or even exacerbate socio economic inequalities (Zeng et al. 2018). Second, there is the risk of over reliance on automated systems, where a lack of appropriate Explainable AI (XAI) fails to foster justifiable trust, leading human overseers to blindly accept flawed algorithmic decisions that could result in severe financial or me2024; Bharatiabarta et al. 2024)(Bharati et al. 2023). Consequently, it is imperative to incorporate a comprehensive framework of AI principles that actively links diverse ethical considerations into the development lifecycle of these technologies (Zeng et al. 2018).

Future Work

To advance the understanding of AI's economic impact across multidisciplinary sectors, several avenues for future research are highly recommended.

- **Expansion of Sector Comparative Studies:** Future work should expand the MEIAF to include sectors such as automated supply chain logistics and autonomous transportation, leveraging advanced game based platforms to benchmark AI performance in highly dynamic, multi agent environments (Hu et al. 2023).
- **Integration of Neurosymbolic Architectures:** Researchers should investigate how the explicit integration of learning and reasoning found in neurosymbolic artificial intelligence can improve the creative problem solving capabilities of economic agents, thereby increasing their resilience to anomalous m2021; Gizzis (Marra et al. 2021)(Gizzi et al. 2022).

Conclusion

This paper has provided a comprehensive comparative study on the economic impact of artificial intelligence across multidisciplinary sectors, highlighting the profound ways in which intelligent systems alter traditional market dynamics and operational efficiencies. By analyzing the intersection of updated economic theories, probabilistic reasoning, and simulated decision-making frameworks, we have demonstrated that AI must be treated as a transformative economic agent rather than a standard technological tool. The proposed Multidisciplinary Economic Impact Assessment Framework (MEIAF) offers a structured methodology for capturing these complex cross-sector interactions, bridging the gap between theoretical microeconomics and applied algorithmic deployment.

Furthermore, by outlining an evaluation methodology utilizing an Indian data topic of research, this study contextualizes the immense potential and inherent challenges of deploying AI in rapidly scaling, data-diverse environments. While significant hurdles remain, particularly regarding data scarcity, the simulation-to-reality gap, and the pressing need for explainable and

The Research Analytics ISSN (Online): 3107-6165
Volume 2, Issue 1, April-June 2026

ethically governed AI the economic incentives for overcoming these barriers are unprecedented. Ultimately, as AI continues to evolve through advancements in neurosymbolic logic and creative problem-solving, multidisciplinary frameworks will be essential for ensuring that these technologies deliver sustainable, equitable economic growth across all sectors of society. As AI systems become increasingly capable, fostering creative problem-solving abilities in autonomous agents will be crucial for navigating the unpredictable dynamics and uncertainties of real-world deployments (Gizzi et al. 2022).

References

Marwala, Tshilidzi, and Evan Hurwitz. "Artificial Intelligence and Economic Theories." 2017. https://arxiv.org/pdf/1703.06597v1

Gizzi, Evana, et al. "Creative Problem Solving in Artificially Intelligent Agents: A Survey and Framework." Journal of Artificial Intelligence Research 2022, 2022. https://doi.org/10.1613/jair.1.13864

Marra, Giuseppe, et al. "From Statistical Relational to Neurosymbolic Artificial Intelligence: a Survey." 2021. https://arxiv.org/pdf/2108.11451v4

Shafer, Glenn. "Probability Judgement in Artificial Intelligence." 2013. https://arxiv.org/pdf/1304.3429v1

Bennett, Casey C., and Kris Hauser. "Artificial Intelligence Framework for Simulating Clinical Decision-Making: A Markov Decision Process Approach." Artificial Intelligence in Medicine. 57(1): 9-19. (2013), 2013. https://doi.org/10.1016/j.artmed.2012.12.003

Bharati, Subrato, et al. "A Review on Explainable Artificial Intelligence for Healthcare: Why, How, and When?." IEEE Transactions on Artificial Intelligence, 2023, 2023. https://doi.org/10.1109/TAI.2023.3266418

Zeng, Yi, et al. "Linking Artificial Intelligence Principles." 2018. https://arxiv.org/pdf/1812.04814v1

Labarta, Tobias, et al. "Study on the Helpfulness of Explainable Artificial Intelligence." Longo, L., Lapuschkin, S., Seifert, C. (eds) Explainable Artificial Intelligence. xAI 2024. Communications in Computer and Information Science, vol 2156, 2024. https://doi.org/10.1007/978-3-031-63803-9_16

Hu, Chengpeng, et al. "Games for Artificial Intelligence Research: A Review and Perspectives." 2023. https://arxiv.org/pdf/2304.13269v4