A Study on the Role of Artificial Intelligence In improving Resource Allocation

OPEN ACCESS

Volume: 13

Special Issue: 1

Month: April

Year: 2026

P-ISSN: 2321-788X

E-ISSN: 2582-0397

Citation: Sindhuja, B., and D. Kotteswaran. "A Study on the Role of Artificial Intelligence Inimproving Resource Allocation." *International Journal of Arts, Science and Humanities,* vol. 13, no. S1, 2026, pp. 71–76.

DOI: https://doi.org/10.34293/sijash.v13iS1-Apr.10653

Ms. B. Sindhuja
II MBA Student, Department of Management Studies
Vel tech Rangarajan Dr. Sangunthala R&D Institute of Science and Technology
Avadi, Chennai, India

Dr. D. Kotteswaran
Assistant professor, Department of Management Studies
Vel tech Rangarajan Dr. Sangunthala R&D Institute of Science and Technology
Avadi, Chennai, India

Abstract
Artificial intelligence is really changing things for companies. Companies use intelligence to make big decisions about things like people and materials and money. This artificial intelligence helps companies make these decisions so they can use their resources in a way. This is different from the way of planning, which was done by hand or used special software like SAP or Oracle. These old systems had fixed rules for planning and scheduling as well as managing inventory. Artificial intelligence uses machine learning to look at what happened in the past predict what will happen next and give suggestions for improvement in time. The research shows how artificial intelligence has improved over time from tracking what is happening to predicting what will happen next. This has led to a reduction of waste by 20-30%, faster decision-making and successful projects. Artificial intelligence is better than solutions because it can handle many different constraints, such as skills, availability and cost. It can also learn from results. Work with other systems like ERP and CRM beyond just using programming languages like R and Python. This can be used in different fields, including manufacturing, IT services, healthcare and project management. Artificial intelligence helps companies do things in a way that allows important people to focus on high-value work and minimize waste. The main points are about intelligence, resource allocation, ERP, optimization and CRM integration.

Keywords: Artificial Intelligence, Resource Allocation, ERP, Optimization, CRM Integration.

Introduction

In today's days, companies are under a ton of pressure to use their resources wisely—people, money, equipment, time, you name it. To stay ahead, people cannot afford to waste anything. The old ways of doing things like doing schedules by hand or relying on systems such as SAP or Oracle just do not work anymore. Companies that want to stay need to find new ways of doing things because the old ways of doing things like manual scheduling, are not good enough. People who want to stay have to be smart about how they use their time and resources and the old ways of doing things like relying on rigid ERP systems suchas SAP or Oracle will not help them stay

ahead. When demand shifts fast, those systems struggle. Things just end up wasting resources and making everything run in this awkward way and some chances may be missed out to make everything better. AI seems to be fixing a lot of these issues now. It looks at old data to figure out what might happen next, and then it gives ideas on how to make the most of your stuff exactly when it matters. I think that's the key part, because it's not tied down by those outdated ways of doing things. Sometimes it feels like the operations get smoother without even trying too hard. AI can juggle all sorts of constraints at once: who's available, what things cost, who has the right skills and how everything connects. Teams can plug AI straight into their usual ERP and CRM systems. In this way decisions happen faster, on the spot almost. This really makes a difference in how things work every day. The change is happening everywhere. For example, in manufacturing companies are getting more out of their equipment and people. This is a deal because it helps companies do more with what they have. The change is showing up in different places, like the way companies make things and get work done. Hospitals now find it easier to manage beds and organise personnel timetables. Project managers aim for a balanced distribution of work to ensure dates for completion aren't missed. Cloud services will also vary in the amount of processing ability they provide, depending on current demands, saving money and boosting performance. AI keeps learning from new stuff constantly. So overall, it lets teams focus on being efficient instead of just grinding away.

But there are issues. Not everything goes perfectly. Data can be a mess sometimes, and fitting AI into other systems is not always easy. Then there are those ethical parts that come up, and figuring out how to explain what AI decides, so everyone trusts it. I think transparency is the trickiest bit here,it feels like people need to see inside the process, or they just hesitate. When organizations deal with these problems directly Artificial Intelligence can really change the way they handle things, making things work better and getting results all around. Artificial intelligence can be used by organizations to increase productivity and achieve outcomes. When businesses use artificial intelligence to manage resources, this is what occurs.

Objectives

1. To study the role of artificial intelligence in improving resource allocation.
2. To see how using intelligence to allocate resources can help in real life such as using things more efficiently, saving money, being able to adapt and making decisions quickly.
3. To find out what problems come up when we try to use intelligence to allocate resources, like when the data is not good, it is hard to get systems to work together and we have to think about what is fair and right.

Review of Literature

Javad Hassannataj Joloudari et al (2022) the results of their research shows that AI-based techniques greatly enhance the performance of systems in terms of decreased latency, power consumption, and response time, as well as increased efficiency and throughput. It was also found in the research that deep reinforcement learning techniques are effective in automated and real-time resource management in complex computing systems.

Proggo Choudhury et al (2025) found that the techniques reduced system latency by up to 40%, power consumption by 25-35%, and response times to below 2ms. Throughputs rose by 30-50%, with the efficiency improvements helping to manage changing workloads in cloud and edge computing. Deep reinforcement learning excelled in adaptive resource management, delivering 28% better performance than traditional approaches in complex operations.

Arshad Farhad et al (2023) found that AI improved the packet success ratio by 32% in static and 28% in mobile scenarios over standard LoraWAN ADR. It reduced energy consumption and

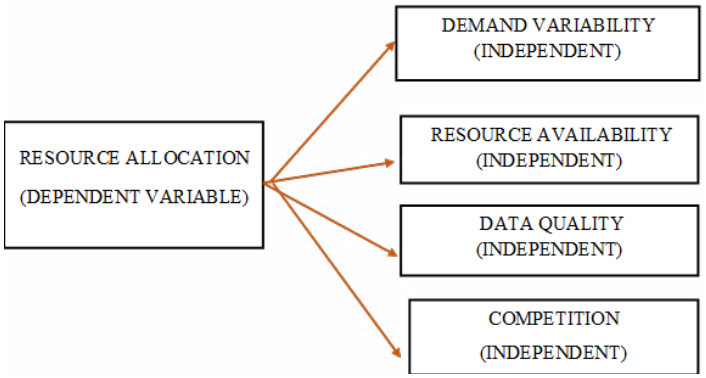
convergence time by limiting retransmissions with proactive SF assignment. The method performed well in dynamic channel conditions, achieving better performance in network reliability for large-scale IoT networks compared to previous ADR improvements.

In their study, Aniket Abhishek Soni et al (2025) discovered that the ML ensemble achieved an improvement in resource utilization between 25% to 35%. The energy consumption and SLA violations were reduced by up to 40% concerning reactive methods. The predictions were really good, they were over 95 percent of the time. This meant we could respond to changes in our workload a lot faster with extra work. The accuracy, of predictions was very high, so we could make decisions quickly when the workload changed.

Research Methodology

This study uses a method to look at trends and how things are connected when it comes to using Artificial Intelligence for allocating resources. The goal of the research methodology for this study is to find out what makes Artificial Intelligence work well or what gets in the way when we use Artificial Intelligence for allocating resources. The research methodology for this study is really about understanding Artificial Intelligence and how it affects the way we allocate resources.This makes the research more productive and providesa deep understanding of the study.

Research Model



Statistical Tools

The statistical tools which are used for my study are correlation and chi-square. These tools are used to determine the influence of the variables.

		Artificial Intelligence	Resource Allocation
Artificial Intelligence	Pearson correlation	1	.349
	Sig.(2-tailed)		.000
	N	121	121
Resource Allocation	Pearson correlation	.349	1
	Sig.(2-tailed)	.000	
	N	121	121

Correlation

Null Hypothesis (HO): There is no relationship between artificial intelligence and resource allocation.

Alternate Hypothesis (H1): There is a relationship between artificial intelligence and resource allocation.

Correlation

Interpreation

Here the p-value is greater than 0.05 in correlation analysis. This means we cannot say there is no link between intelligence and resource allocation.So, it seems artificial intelligence and resource allocation do go up together.The data actually shows that as intelligence increases,resource allocation also tends to increase.This makes sense because artificial intelligence can help make use of resources.Artificial intelligence and resource allocation appear to have a connection.In terms of when artificial intelligence is used, more resource allocation results inbetter outcomes. The correlation between intelligence and resource allocation is positive, which means that as artificial intelligence is used more resource allocation metrics also get better. This is in line with findings that indicate a relationship between resource allocation and artificial intelligence. Artificial intelligence has the potential to significantly alter how organizations manage their resources, improving overall performance and increasing efficiency. When businesses address these problems head-on and use intelligence to manage resources, artificial intelligence can boost productivity and improve overall outcomes.

Chi-Square

Null Hypothesis (HO): There is no association between artificial intelligence and resource allocation.

Alternate Hypothesis (H1): There is an association between artificial intelligence and resource allocation.

Chi-Square Tests			
	Value	**Degree of freedom**	**Significance (2-sided)**
Pearson Chi-Square	49.547	16	.000
Likelihood Ratio	51.181	16	.000
Linear-by-Linear Association	14.655	1	.000
N of Valid Cases	121		

Interpretation

A statistically significant correlation between resource allocation strategies and artificial intelligence (AI) adoption/use in your dataset is confirmed by the chi-square test statistic of 49.547 with 16 degrees of freedom and $p < 0.001$. This disproves the null hypothesis of independence, which states that the two categorical variables are not happening independently and that the application of AI has a significant impact on the allocation or optimization of resources.

Anova

Null Hypothesis (HO): There is no relationship between artificial intelligence and resource allocation.

Alternate Hypothesis (H1): There is a relationship between artificial intelligence and resource allocation.

ANOVA					
Model	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Regression	54.459	5	10.892	9.569	.000
Residual	130.897	115	1.138		
Total	185.355	120			

Interpretation

The combined set of predictors demand variability, data quality, resource availability, and competition significantly explains variance in resource allocation outcomes, rejecting the null hypothesis that there is no predictive relationship, according to the ANOVA result ($F = 9.569$, $p < 0.001$). The significant model supports a more general relationship between artificial intelligence and resource allocation in your research context, even though predictors are explicitly listed. For example, AI probably uses data quality and adjusts to demand variability for optimal outcomes, as demonstrated by previous chi-square results directly linking AI adoption.

Summary of Findings

- The analysis demonstrates that resource allocation is directly impacted by artificial intelligence.
- Higher levels of automation brought about by AI enabled businesses to provide real-time adjustment and dynamic resource allocation, as well as react more swiftly and precisely to changing demand.
- Planning was made easier and resource surpluses or shortages were decreased thanks to AI's predictive models, which accurately predicted future resource requirements.
- However, obstacles about data quality, integration, and human resource capacity persisted in restricting the uptake and efficient application of AI.

Conclusion

The research indicates that artificial intelligence outshines old-school ERP and static methods by juggling various aspects simultaneously, including skills, costs, and availability,and it fits right in with systems companies already use. In manufacturing and stuff like healthcare, plus project management too, it can cut down waste by maybe 20 to 30 percent. That seems like a solid improvement in those spots.Problems stick around though. Data gets messy sometimes and integrations are not always straightforward. Ethical stuff comes up, and people need the skills to handle it all. No one can be sure of fixing those problems but they complicate things a lot.Solving those is key to getting everything AI can offer. Research needs to dig into AI frameworks built for specific industries and track how AI changes things over the long haul. It's the favourable way which helps companies scale up and really make AI work for them.

Refernces

1. Ahmed, Q.W.; Garg, S.; Rai, A.; Ramachandran, M.; Jhanjhi, N.Z.; Masud, M.; Baz, M. "AI-Based Resource Allocation Techniques in Wireless Sensor Internet of Things Networks in Energy Efficiency with Data Optimization". Electronics 2022, 11, 2071, pp.1-13.
2. Ye Yu, Zhongheng Zhang, Rongju Sun, Haiping Liu, Suwei Yuan, Ting Jiang, Meng Wu, Cheng Guo, Yuelei Guo, Jianchao Weng, Xingdong Zheng, Feng Yuan. "AI-guided resource allocation and rescue decision system for medical applications. "Future Generation Computer Systems118,2021, pp.485-491

3. Ghelani, Diptiben.”Optimizing Resource Allocation: Artificial Intelligence Techniques for Dynamic Task Scheduling in Cloud Computing Environments.” International Journal of Advanced Engineering Technologies and Innovations, vol. 3, no. 1, 10 Dec. 2024, pp. 132-156.
4. L. Schuler, S. Jamil and N. Kühl, “AI-based Resource Allocation: Reinforcement Learning for Adaptive Auto-scaling in Serverless Environments,” 2021 IEEE/ACM 21st International Symposium on Cluster, Cloud and Internet Computing (CCGrid), Melbourne, Australia, 2021, pp. 804-811.
5. Zhang, Haijun, et al. “Artificial intelligence-based resource allocation in ultradense networks: Applying event-triggered Q-learning algorithms.” IEEE Vehicular Technology Magazine 14.4 (2019), pp. 56-63.
6. Rahman, Mirzanur, et al. “Optimizing resource allocation in agriculture through IoT and AI.” 2023 7th International Conference on Electronics, Communication and Aerospace Technology (ICECA). IEEE, 2023, pp. 1573-1578