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Next-Gen Advanced Planning Systems: AI and Analytics in Operational Strategy

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Abstract : The rise of domains such as artificial intelligence and analytics has shifted the paradigm of operations in businesses. Prosystems NextGen APS is an automated system supplemented with intelligent computing, data-based decision-making, and decision-making in conjunction with automation to simplify the planning process. The systems also lead to the realization of resilience, agility, and predictive efficiency in dynamic business environments. The IoT-related analytics allow companies to shift into active, adaptive systems, rather than inert, reactive systems, capable of responding to real-time changes and continually improving themselves with the assistance of AI models, which remain in the process of evolution. The paper provides an overview of the most significant works of current research in which the role of AI-based operational systems, urban-industrial intelligence, and autonomous agent-based architecture is evaluated in the context of changing the future of strategic planning.

IndexTerms **- Artificial Intelligence, Advanced Planning Systems, Operational Strategy, Predictive Analytics**

1. Introduction

Operational planning is increasingly driven by dynamic and intelligent systems capable of making decisions and analyzing them in real time. The AI-analytics shift has transformed how organizations seek to navigate complex and data-saturated environments. The old-fashioned planning systems that were applied in the past lacked the capability to adapt to unstable market and supply chain uncertainties. Next-Gen Advanced Planning Systems (APS) incorporate elements of artificial intelligence, machine learning, and predictive modeling to simplify decision-making processes [1]. The business plan is linked to changing data trends and process automation owing to the implementation of algorithmic foresight and operational intelligence embedded in such systems.

The contemporary business climate is becoming increasingly dependent on intelligent infrastructure to conduct business, and automation is no longer limited to handling traditional processes, as it now possesses inherent intelligence. This transition to AI-specific planning is both technical and strategic, as it offers an organization the opportunity to use AI-specific intelligence at one or another stage of the decision-making process. The platform is built on the foundation of big data analytics, cloud computing, and the development of digital twins to simulate, forecast, and execute operational plans in an adaptive and realistic way [1]. The paradigm is as follows: planning is a forecasting process, coordination is an autonomy process, and execution is a process based on analytical perceptions.

2. Methodology

This methodology is the systematic literature review, which assumes synthesis of the existing studies and the improvement of the Next-Generation Advanced Planning Systems (APS). The methodology framework was developed to capture the wide range of directions and dimensions of the AI-based operations strategy, predictive analytics, and adaptive planning frameworks.

2.1 Search Strategy

The search strategy entailed the identification of academic articles, conference publications, and academic book chapters that are peer-reviewed and published in the past five years (2020–25). The search terms that comprised the search keywords included: AI in planning systems, advanced operational analytics, autonomous agents in the supply chain, digital twin and 6G integration, and adaptive intelligence in industrial operations. Starting the search, the output was limited to the subject that matched the intersection of artificial intelligence and analytics with the operational strategy with the help of Boolean operators (AND, OR).

It used the major academic publishers, open-access databases, and online databases of peer-reviewed articles on the topics of computer science, industrial engineering, and operations management. The reviewed studies that contained empirical information, theoretical contributions, or general descriptions of the AI-based planning systems were termed as the qualifying studies.

2.2 Inclusion and Exclusion Criteria

Relevance and rigor were achieved through the inclusion and exclusion criteria that were taken into consideration. The inclusion criteria were as follows:

- Studies published within the last five years (2020–2025).
- Research focusing on AI-enabled operational systems, predictive analytics, or digital twin integration.
- Peer-reviewed journal articles, conference papers, or academic book chapters with methodological transparency.

The exclusion criteria included:

- **Sources lacking domain relevance**: Studies that do not explicitly address AI, analytics, or digital transformation within the context of operational strategy, supply chain management, or planning systems were excluded. For example, papers which were simply based on the theory of AI but were not applied to the planning systems were not included.
- **Non-peer-reviewed or non-academic literature**: The grey literature that comprised of white papers from the company, blogs, promotional case studies, or media articles that are not published through an academic/professional research process were avoided to achieve methodological rigor.
- **Papers with insufficient methodological transparency**: Studies which failed to specify the research design, data source, or analysis scheme (i.e., were vague in how they described the modeling assumptions in the articles) and those which had not validated their simulation results had not been considered.
- **Outdated frameworks or legacy systems focus**: The studies that involved older ERP systems or planning models and that could not be implemented using AI, machine learning, and digital technologies were deemed to be ineligible, and this did not represent the next generation of this review.

2.3 Selection Process

The selection process followed a three-stage review:

1. **Initial Screening:** The titles and abstracts were checked based on their applicability to Next-Gen APS and AI-based operational models.
2. **Full-Text Review:** The works that had passed the initial selection criteria were reviewed in sequence to evaluate the work, the methodology, and inferences.
3. **Thematic Categorization:** Thematic core of subsequent parts of the analysis was constructed with the assistance of thematic groupings of selections of papers on the selected focus areas under the main focus fields such as AI-infused operations, urban and industrial intelligence, autonomous agents, and healthcare application.

This methodical strategy helped to make sure that the topics which were being selected were cross-industrial and covered the theme of operational strategy being revolutionized by AI, analytics, and digital transformation on the broad level.

2.4 Analytical Approach

It was examined as part of a qualitative synthesis of patterns, conceptual frameworks, and technological convergences based on the literature. The methods of comparative assessment that are followed to trace the trends of AI application to the planning systems are non-dynamic decision models and dynamic systems with learning. The cross-sectoral analysis was also performed to look at the AI-based planning alteration in the manufacturing, urban infrastructure, food services, and healthcare industries.

3. AI-Infused Operations and Planning

The nature of application monitoring and optimization has been altered by an AI-based IT operational paradigm. In the next-generation operational systems, the performance control, incidents, and automated allocation of resources are used [1]. The machine learning algorithms are also able to predict anomalies in case the operations are already underway and suggest a preventative measure in case something goes wrong. Predictive maintenance provides and minimizes downtimes, scalability, and affordability of enterprise ecosystems.

Self-planning artificial intelligence refers to a type of planning system in which self-adaptive algorithms are applied. It reacts to alterations of data and always improves performance. These predictive systems are more applicable in assisting individual organizations with planning production and logistics using predictive analytics. The operational strategy would bring an element of resilience which would not only make it more efficient but also react dynamically to the ambiguity of resources and resource fluctuation in a dynamic scale with the assistance of AI [1].

Moreover, AI-planning systems are applied in the city infrastructure and transport sector, in operations intelligence, which also involves becoming more closely connected with social services and industrial automation [2]. The case of smart transportation systems implemented in urban planning programs shows the application of AI to address disconnects in urban activities, including

energy use, traffic operations, and emergency response. These systems allow integrated planning with integrated information among management silos of a traditional management environment.

4. Intelligent Urban and Industrial Planning

The recent trends in city planning are founded on the implementation of Intelligent Transportation Systems (ITS) as a continuation of the advanced models of operational planning [2]. These systems are based on AI algorithms and analytics that determine the movements within the city, forecast traffic jams, and even dynamically distribute transport resources. The smart transport systems add value to the car by predicting the bottlenecks and directing the flows relative to the real-time data analytics that will lead to the increased sustainability and efficiency of the metropolitan operations [2].

Warehouse logistics, supply chain challenges, and production plans are complex, and they can be addressed with the help of AI-based systems in the industry. The advantage of the environments is that they are utilizing AI-enhanced decision models that are maximizing throughput and limiting wastage. The adaptive learning processes ensure accuracy and versatility; that is, the operational parameters can be optimized at every step.

The remaining innovation of the AI-based operational systems is the intelligent adaptation models. They are evolutionary computation models which help systems to evolve through an iterative law of learning, genetic algorithms, and neural changes which mimic biological evolution [3]. Such adaptive systems have been found to best suit planning processes as they have the ability to learn from past processes and offer better solutions to the same problem that has been encountered. The adaptive intelligence has been applied within the manufacturing business, specifically in adaptation of systems to the changes in the demand prediction, energy consumption, and planning of human labor.

Adaptive planning models also apply a hybrid optimization method which solves the problem using a combination of heuristic, probabilistic, and deterministic planning algorithms. This hybridization introduces a balance between exploration and exploitation that fosters innovation and predictability in decision-making. The result architecture consists of active operational ecosystems that are responsive to uncertainties in supply chains, production, and service delivery practices [3].

5. AI-Enhanced Decision Systems in Operational Strategy

AI has improved the activities in organizations tremendously in decision-making. Smart analytics and big data-based innovative decision systems are now implemented in the fields of finance, manufacturing, and urban automation [4]. They are systems that integrate information from various sources to generate predictive intelligence on how resources should be allocated, and how performance management and optimization should be enhanced.

Information-processing systems using neural networks are AI-based and are built on neural networks with several layers where intricate associations in the operational information and the translation of descriptive analytics into prescriptive plans are detected and transformed. Such a shift makes strategic planning more dynamic rather than a static process, as it evolves through continuous learning [4].

AI is applicable in the manufacturing industry to manage the production lines, supply quality, and logistical organization. Examples of AI used in finance are the optimization of investment portfolios, fraud detection, and real-time management of urban infrastructure in automation. The reason is that AI is versatile enough to be used across various contexts within planning systems, where intelligent responsiveness forms the basis of future strategic projects [4].

Table 1: Comparative Analysis of Traditional and Next-Gen Advanced Planning Systems

Feature	Traditional APS	Next-Gen AI-Driven APS
Decision Basis	Historical and static data	Real-time adaptive analytics
Responsiveness	Low, reactive	High, predictive
Data Processing	Manual and rule-based	Automated, learning-based
Integration	Limited across domains	Multi-domain interoperability
Flexibility	Constrained by pre-defined parameters	Evolving through adaptive intelligence
Strategic Value	Efficiency-focused	Intelligence-driven operational optimization

Source: Compiled from [1], [2], [3], [4]

6. Integration of 6G, AI, and Digital Twin in Next-Gen APS

The next phase of autonomous systems in real-time environments will emerge with Advanced Planning Systems, alongside the continuous interface between physical and digital spaces enabled by digital twin systems and 6G connectivity [5]. This is through digital twins that generate virtual systems of real systems. Such virtual models' simulation is constantly simulable, controllable, and optimizable on working process aspects [5].

The use of AI and digital twins technologies will enhance the feedback process, and develop sustainable operational insights that could be utilized in order to introduce changes to the strategies in real-time. One of them belongs to the sphere of supply chain management, and in this case, the digital twins have a potential to model a system of logistics and design demand scenarios under

different conditions. The results are evaluated, and optimal resource distribution, cost reduction, and sustainable operations are recommended with the assistance of AI models [5].

City digital twins rely on the information provided by IoT sensors, power grids, and transport systems to enable proactive planning and operations. This would help in the creation of self-regulating and self-optimizing cities. These technologies will be combined to enable a shift from deterministic control planning to adaptive orchestration [5].

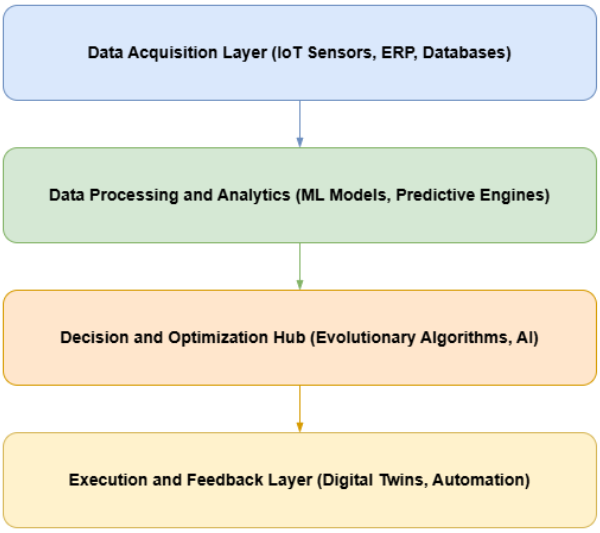

Figure 1: Diagram of AI-Driven Advanced Planning System Architecture
Figure 1 illustrates the layered architecture of an AI-Driven Advanced Planning System, depicting the flow of data from acquisition through analytics, optimization, and feedback for intelligent operational decision-making.

Source: Adapted from [1], [3], [5]

7. Sustainable Technology Integration in Operational Strategy

The advancement of Next-Gen Advanced Planning Systems (APS) is also influencing sectors such as food service, indicating a shift in operational strategies toward models founded on AI-enabled analytics and sustainable technology [6]. As it has been demonstrated in the case of the food service industry, AI can be used to make the process easier and more eco-friendly. It is now possible to manage demand and supply through smart systems, minimize waste, and improve standardization using information on production, logistics, and consumer behavior [6].

This has led to a remodeling of the operating model in this industry, incorporating demand forecasting that allows purchasing and manufacturing functions to adjust in real time. Sales and sensor data are inputted into the AI systems and predict consumption patterns and recommend a change in the operation. This will reduce inventory and overproduction costs, resulting in improved sustainability performance. Moreover, optimizing energy consumption using complex analytics can also be achieved through food processing and distribution, which demonstrates the interrelation between environmental responsibility and innovation [6].

Sustainability models based on AI align with the digital transformation of operations management. These systems will support the use of renewable resources, selection of low-carbon logistic routes, and establishment of transparency through digital tracking technologies. This re-engineers the organization processes, where AI is not the efficiency tool but a corporate responsibility and an environmental protection tool [6].

8. AI-Powered Autonomous Agents in Planning Systems

The other important trend that the next-generation planning systems have brought is the autonomous agents, which are developed on the concept of AI. These agents are used in multi-agent systems and they execute certain tasks of the operations separately and communicate with the rest of the intelligent agents [7]. These systems use reinforcement learning and reasoning to derive meaning out of data, make decisions, and perform actions that are not interfered with by human beings. These re-engineered processes are more accurate, faster, and more flexible than previous processes in the context of business automation [7].

The autonomous agents are able to make decisions at diverse levels within the organization and coordinate the schedule of the resources' distribution and usage with that of the remaining agents. This type of AI agent will be able to automatically respond to outsourcing, re-sourcing, and rerouting logistics in the event of unforeseen disruptions in supply chain management. It will help the businesses stay afloat and to be responsive despite being in hard times.

Distributed intelligence is one of the properties of agent-based APS systems. They are also localized agents, and able to make localized decisions. These agents become more efficient over time, adapting to both internal and external factors with the help of

deep learning algorithms. The decentralized model is measurable and flexible to the intricate and dynamic business environments that would otherwise have been addressed using centralized control [7].

Next, we can now have hybrid planning systems that combine human intuition and autonomous analytics with agentic AIs. Intelligent agents can be assigned repetitive, high-volume data tasks, while human planners focus on high-level decision-making. The result of the human-AI symbiosis is the enhancement of the quality of the choices, along with the formation of the strategies in the organization on the basis of the data and scalability [7].

9. Edge Computing and Real-Time Decision Frameworks

The fast mobile technology has seen the transformation of the real-time autonomous edge systems to accommodate the distributed planning models [8]. In edge computing, data sources are located near where AI algorithms are executed, resulting in reduced latency and significantly faster response times. This is impossible without Next-Gen APS, where real-time adaptations are of the highest priority, like logistics routing, inventory management, and fluctuating demand management [8].

This approach that drives AI to the local machines and nodes is referred to as edge computing, where the local machines and local nodes run the data streams of the raw data using algorithms to forecast and pass the simplified actions back to the central systems. These distributed systems are self-managed networks, which coordinate strategic decision-making and performance of operation in a constant manner.

The organization will still be able to realize a high operational efficiency in the case of a volatile connectivity state in edge-based APS. The systems can also be used in a scalable mode in which localized operations can be extended without necessarily leaving alignment with global strategies. The edge computing and the agentic AI lead to a smart, strong distributed intelligence system that can be used as an autonomous goal-driven system [8].

Such live decision structures also have prediction features in the other industries like manufacturing and retail. They improve the regulation of equipment operation, human resource administration, and interaction with the consumers. The inclusion of AI and edge computing will provide companies with situational awareness and chances to preempt and overcome the challenges to enhance the level of responsiveness and cleverness of operational habits [8].

10. AI and IoT Integration in Healthcare Planning Systems

Healthcare is among the most dynamic industries in regard to Next-Gen Advanced Planning Systems, whereby patient data, resource management, and quality of the treatment are enhanced. Healthcare centers have also been transformed by AI and IoT to become reactive in the treatment approach and predictive and preventative in healthcare approach [9]. It is achieved through the combination of the information that exists in wearables, diagnostic sensors, and electronic medical records to produce potent analysis models that are used in both operations and clinical decision-making [9].

Hospitals will be in a position to use their funds more effectively since the AI-powered healthcare planning will enable predicting the number of clients, reorganizing the staffing schedule, and controlling the stocks of medical supplies. The predictive analytics help to more accurately rectify the precision of the planning process and minimize the volume of waste; however, the IoT-based monitoring allows observing in real-time how the company works under specific operational conditions. One such instance is that the logistics systems of the hospital, which will be integrated with the IoT sensors, will have the opportunity to monitor the transport of equipment to streamline the space in hospitals and put in place predictive maintenance systems [9].

In addition, the intelligent systems are used to aid in the application of data-driven personalized medicine. The AI planning systems will determine patterns and associations of the genetic, environmental, and behavioral data with the aim of developing individualized treatment plans. Such operational intelligence may assist the health facilities to offer active patient-oriented services that are strategically geared towards the organizational objectives at large [9].

Scalability and flexibility of the healthcare systems are also enhanced by the crossover of AI and IoT. Combined systems assist medical practitioners to spread geographically and normalize business in various places. It is a rational adjustment in the healthcare strategies towards agility, immediate responsiveness, and flexibility in healthcare operations [9].

11. Next-Gen AI for Precision and Preventive Healthcare

The future of medical planning is the application of specific AI-approved preventive machines. This type of system uses AI models, which leverage machine learning and predictive analytics to evaluate health risk, track patient well-being, and recommend preventive care measures [10]. Etiologic fragmentation of clinical trials, past patient data, and environmental data is processed by high-technology algorithms to give the first signs of the disease, to create interventions in a timely manner, and to allocate the medical resources in an effective way [10].

This operational intelligence is applicable in the simplification of the healthcare system since it helps to reduce the number of emergency cases and optimize the utilization of diagnostic tests. The hospitals and clinics will be in a position to better make their forecasts of the demand in patients, allocate the resources in an appropriate manner, and present high-quality services. It is a proactive and not a reactive model of healthcare, where AI is the central point of the healthcare operation channel [10].

Moreover, the AI-based planning systems are also penetrating the digital health ecosystem as a whole. These systems have been integrated with telemedicine, electronic health records, and technologies in diagnosing, making them smarter. Another method is predictive algorithms, which are optimal in the treatment plans, based on the performance of the patients and the feedback, creating a self-improvement mechanism of the treatment plan. The subsequent outcome is the establishment of a dynamic and elastic healthcare system that is responsive to demographic and epidemiological changes [10].

Next-Gen APS ideas are interdisciplinary, and it is manifested in the field of interoperability in AI, analytics, and healthcare. With this type of intelligent integration of design, one can make systems more efficient, less tasking, and more strategically flexible within the medical, logistics, urban infrastructure, and production scenery.

12. Discussion

Next-Gen Advanced Planning Systems (APS) is one of the significant changes in the digital empowerment of the traditional operational strategies. In industries, it is possible to invite AI to be an analytical engine and decision-maker. Continuous improvement can be carried out using predictive analytics, automated integration, and adaptive intelligence whereby the information driving and guiding the decision-making actions can be used.

The other significant problem of the operational strategy is the alignment of the strategic control and autonomy based on the data. The companies should find the compromise between human control and computerization in order to make responsible and sustainable business. The concept of the AI-centered decision-making cycles suggests the flexibility of the organization and its openness, and technical profile.

The shift toward the smart planning systems is a change that is technologically possible, not to mention the fact that such a move is a strategically sound decision, as the sources reviewed have already made it obvious. AI implementation in APS has helped to enhance the accuracy, resource optimization, and flexibility of the systems in the field of urban planning, healthcare, sustainable production, etc. The main conclusion of these findings is that operational intelligence ceases to be a supporting tool but becomes the cornerstone of the contemporary strategic management.

13. Future Directions

As the literature on Next-Gen Advanced Planning Systems (APS) demonstrates, there have been considerable steps towards the utilization of artificial intelligence, analytics, and automation of the operational strategy. Nevertheless, the study and practice have several gaps that must be considered in future study.

13.1 Strengths of Current Research

The available literature sources can be used and provide useful information on AI-based optimization, predictive analytics, and real-time decision-making. Kallur (2025) and Taneja et al. (2025) refer to adaptive planning models and digital twins, and the latter have high overlaps in capabilities. In the same way, Prithviraj et al. (2025) and Ghaffar and Oyeronke (2025) refer to the possibility of having autonomous agents and intelligent transport systems to improve coordination and scalability.

The dynamic nature of AI in regard to planning the environment as a responsible practice is also brought out by the sustainability approach, as illustrated in Mahusain et al. (2025). Together, the literature helps to recognize AI as a necessary part of the data-driven approach development.

13.2 Weaknesses and Research Gaps

Despite such developments made by individuals, there are a few hurdles.

On the one hand, the problem of the heterogeneity of AI models, incompatibility of old systems, and incompatibility of IoT infrastructure is not discussed yet. This is a weakness in ensuring good integration of information in the distributed environment.

Second, there is no literature on research studies concerning autonomous decision-making systems in terms of ethics and governance. Most studies have been done on the viability of technologies, not liability, in the processes of AI usage, being transparent and devoid of bias.

Third, the existing AI planning models do not have cross-domain generalization; that is why industry-specific ones are more widespread, namely in healthcare and manufacturing. The research that will be conducted in the future should focus on discovering more flexible structures that do not need to be reconfigured to occur in other industries.

Finally, there are no longitudinal studies on the effects of AI-based planning systems in the long run. This limits the concept of sustainability of such systems, workforce adaptation, and strategic resiliency.

13.3 Directions for Future Research

Future research should address the following areas:

- Industries that apply AI-based planning systems should have standardized systems used to assess their performance.
- Experiment with half-autonomous methods of human-AI interaction so as to maintain high degrees of strategic control, but take advantage of autonomous decision-making.
- Explore the ethical AI governance models of operational strategy, which presuppose compliance, transparency, and accountability.
- In the plans of the APS deployment, include socio-technical issues like re-skilling of the workforce, policy coordination, and change of organizational culture.
- Explore 6G and edge intelligence convergence for ultra-responsivity in planning environments with the capacity to make real-time functioning in international networks.

These recommendations will help to close the loopholes, which are already evident in the current studies dedicated to the knowledge, and will give intelligent AI the highest level of intelligible, moral, and efficient systems of operations.

14. Conclusion

The current operational strategy is combined with artificial intelligence and analytics to transform the planning systems into self-evolving and responsive ones. New Generation Adaptive Planning Systems are transforming how organizations plan, speculate, and implement plans in all spheres of business. Such systems are becoming more agile, sustainable, and efficient with the convergence of digital twins, autonomous agents, and predictive analytics into such systems.

The combination of enabling technologies will bring in enterprise real-time and data-driven decisions—i.e., 6G, IoT, and edge computing. The intelligence too is a living creature which learns and gets better, the basis of the future of the operating strategy. The role of AI will no longer be the supportive system offered by the dynamic nature of the business world but the one that will be at the center of the strategic vision and implementation.

References

[1] Kallur, K. (2025, May). NextGen AI-Infused IT Operations Model: Revolutionizing Application Maintenance for Modern Enterprises. In *2025 6th International Conference for Emerging Technology (INCET)* (pp. 1-7). IEEE.
[2] Prithviraj, R., Manishankar, R., & Saminathan, R. (2025). Next-Gen Urban Planning Integrating Intelligent Transportation Systems. In *Urban Mobility and Challenges of Intelligent Transportation Systems* (pp. 507-524). IGI Global Scientific Publishing.
[3] Pahune, S., Venkateswaranaidu, K., & Mathur, S. (2025). *ADAPTIVE INTELLIGENCE: EVOLUTIONARY COMPUTATION FOR NEXTGEN AI*. Notion Press.
[4] Greene, T., Osei, D., & Idowu, M. (2025). Next-Gen Decision Systems: AI-Enhanced Analysis in Finance, Manufacturing, Materials Science, and Urban Automation.
[5] Taneja, A., Kumar, A., Limkar, S. V., Ouaissa, M., & Ouaissa, M. (Eds.). (2025). *6G Urban Innovation: AI and Digital Twin for Next-Gen Sustainable Cities*. John Wiley & Sons.
[6] Mahusain, M. A., Samsudin, A., & Majid, M. A. A. (2025). Next-Gen Eats: Tech, Trends, and Sustainability. In *Technological Innovations in the Food Service Industry* (pp. 271-294). IGI Global Scientific Publishing.
[7] Ghaffar, A., & Oyeronke, A. (2025). Al-Powered Autonomous Agents and Their Role in Next-Gen Business Automation. *IRE Transactions on Education*, *9*.
[8] Sheelam, G. K. (2025). Architecting Agentic AI for Real-Time Autonomous Edge Systems in Next-Gen Mobile Devices. *Advances in Consumer Research*, *2*(3).
[9] Rangarajan, D., Rangarajan, A., Reddy, C. K. K., & Doss, S. (2025). Exploring the Next-Gen Transformations in Healthcare Through the Impact of AI and IoT. In *Intelligent Systems and IoT Applications in Clinical Health* (pp. 73-98). IGI Global Scientific Publishing.
[10] Tale, Y., Verma, P., & Pake, T. (2025, March). Next-Gen AI in Healthcare: Shaping the Future of Precision and Preventive Medicine. In *2025 International Conference on Machine Learning and Autonomous Systems (ICMLAS)* (pp. 1220-1227). IEEE.