Configuration Manual

MSc Research Project

MSC AI for Business

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MSc Project Submission Sheet

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Programme: …… MSc AI for Business …… **Year:** 2023 – 2024

Module: …… MSc Research Practicum/Internship Part 2 ….……

Supervisor: …… Devanshu Anand ……..……

Submission Due Date: …… September 16, 2024 ……

Project Title: Application of Artificial Intelligence in Supply Chain Management

Word Count: … 1017 …… **Page Count** … 9 ….……

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1. Introduction

The application of Artificial Intelligence (AI) in Supply Chain Management (SCM) has benefits that include Increased effectiveness, better decision making and cost cut. This configuration manual aims to illustrate the detailed procedure for the application of AI in SCM by introducing the technologies, applications, recommendations, and case studies.

2. AI Implementation Framework

Step	Objective	Actions
Step 1: Data Collection and Integration	Gather accurate, complete, and timely data from various sources to feed AI models.	- Identify data sources (IoT devices, ERP systems, third-party logistics providers).
		- Ensure data quality by implementing robust data management policies.
		- Integrate data from different formats and standards into a unified system.
Step 2: AI Model Selection and Development	Choose the appropriate AI models and develop them to suit specific SCM needs.	- Select models based on SCM functions (e.g., machine learning for demand forecasting, predictive analytics for risk management).
		- Develop models using historical data and validate them with real-time data.
		- Employ tools like TensorFlow, PyTorch, or custom-built algorithms.
Step 3: Deployment and Integration	Deploy AI models and integrate them with existing SCM systems.	- Develop an integration plan that includes necessary APIs and middleware.
		- Ensure seamless communication between AI systems and existing SCM software.

		- Test the deployment in a controlled environment before full-scale implementation.
Step 4: Monitoring and Maintenance	Continuously monitor and maintain AI systems to ensure optimal performance.	- Set up monitoring tools to track AI model performance and accuracy.
		- Regularly update models with new data to improve accuracy.
		- Conduct periodic maintenance checks to address any technical issues.

3. Key AI Technologies in SCM

Technology	Application	Tools/Devices
Machine Learning	Enhances decision-making by analyzing large datasets to identify patterns and predict outcomes.	TensorFlow, PyTorch, Scikit-learn
Predictive Analytics	Forecasts demand, optimizes inventory levels, and reduces holding costs.	IBM SPSS, SAS, RapidMiner
Internet of Things (IoT)	Collects real-time data on logistics activities, including shipment location and storage conditions.	IoT sensors, RFID tags, GPS trackers
Robotics and Automation	Automates repetitive tasks, such as inventory reordering and warehouse operations, reducing human error and operational costs.	Robotic Process Automation (RPA) software, autonomous mobile robots

4. Use Cases and Applications

Function	AI Application	Benefits
Inventory Management	Demand forecasting, stock optimization, automated reordering.	Reduces overstocking and stockouts, minimizes holding costs, improves customer satisfaction.
Demand Forecasting	Uses historical data and market trends to predict future demand.	Ensures timely product availability, enhances resource utilization.
Logistics and Transportation	Route optimization, predictive maintenance.	Reduces delivery times, lowers transportation costs, minimizes equipment downtime.
Supply Chain Finance	Risk management, fraud detection, working capital management.	Enhances financial stability, improves security, optimizes cash flow.

5. Best Practices for AI Implementation

Data Quality Management

Action: This is why there should be strict procedures on data management that would help one get the right data. This means being able to offer conventional sequential processes for handling data and for validating data and possession of data cleaning techniques with the aim of improving data quality.

Model Interpretability

Action: Explain how it is possible to enhance the level of trust with the AI models of the stakeholders using XAI techniques. The achievement of such a goal is possible by designing AI systems that allow the clients to understand its rationale: This shall assist in gaining confidence from the side of the stakeholders and guarantee the enactment of the law among the regulating power.

Ethical Considerations

Action: See to it that ethical issues are kept at their highest level so that the tools can be used correctly and the identity of the users of the tools are not released to the wrong hands. This includes compliance with the data protection regulation, encouragement of the actions of the AI systems to be accountable and using those measures that will reduce the probability of discriminative decisions by the AI System.

6.Case Studies

Walmart: COVID-19 was managed at Walmart by making use of AI to forecast and order inventory and sales so that Walmart can ensure it has enough stock for such products. Thus, there is a possibility to use AI in supply chain management, as it proves that it can support disruption and also raise the level of customer satisfaction.

DHL: AI was introduced into the logistic chains of DHL for precise usage in some of the application areas such as prognosis of vehicles and the routing depending on the traffic systems. This was done in the sense of wrongfully lowering the operation expenses and increasing the delivery effectiveness as a way of demonstrating that AI has a positive effect on the flow of logistics.

Amazon: The following dynamics have been noted in relation to the AI by Amazon: changes to the routes and the last mile of the delivery. This led to the creation of a framework that enhanced delivery services alongside reduced fuel consumption, thus, the positive impact of AI on the operation efficiency and the natural environment.

7. Questionnaire:

The questionnaire consisted of 15 questions related to AI adoption, technologies being used, advantages and disadvantages. The survey was conducted with 15 participants who are professionals and work in medium and large enterprises with 51 and more employees in different industries. The data was collected using an online survey which was posted on the LinkedIn platform to ensure that the participants were diverse and relevant.

The results deduced that, AI in SCM is growing, especially among major companies. Mid- and large-sized enterprises are benefiting from AI in demand forecasting, logistics management, and predictive maintenance. However, data quality, system integration, and staff training remain challenges. However, AI is becoming a key enabler for competitive advantage in the ever-changing global supply chain environment.

8.Conclusion

To the organization, application of AI in SCM is beneficial in that it facilitates the running of the operations besides the cost of making decisions within the business. Hence, given that the implementation of the AI technologies in the context of the present paper also corresponds with the four-tiered framework and the best practices highlighted in this paper, it can be concluded that the organizations can, in fact, attain the needed competitive advantage within the market with the help of their integration.

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