

Artificial Intelligence: A Footstep Headed For Future SCM

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Abstract - Artificial intelligence (AI) was hosted with an extended motive of developing and creating “intelligent machines” that are capable of replicating, learning, and substituting human intelligence. AI has revealed great potential in instructive human decision-making processes and the subsequent output in various business actions due to its ability to identify business patterns, learning business phenomena, pursue information and analysis of data intelligently. Regardless of its extensive acceptance as a decision-aid tool, AI has been used for limited application in supply chain management (SCM). With an aim of effective exploitation of the potential benefits of AI in SCM, this study concentrates on various sub-fields of AI that are most commonly related to SCM. In so doing, this paper reviews the awareness level as well as the reasons that make AI preferable to SCM and identifies the most fruitful areas of SCM in which we can apply AI and the major challenges that stood in way of AI implementation.

Keywords: Artificial intelligence, Supply chain management, Key areas, Awareness, Challenges, Implementation

I. INTRODUCTION

In this era of modernisation, supply chain excellence mainly depends on the organisations ability to integrate and organise the entire end to end processes of procuring raw materials or components, transforming them into finished goods, and delivering them to customers, regardless of the challenges due to greater demand uncertainty, higher supply risk, and increasing competitive intensity. With the purpose of attaining supply chain excellence, increased visibility across the endwise SC processes is needed and many leading organisations have attempted to enrich their data base and share real-time statistics with their SC partners. SC management (SCM) has been directed towards the substitution of assets (e.g., inventory, warehouses, transportation equipment) with information and now a days become more information reliant^[8].

Now a days with an enhanced vision on attaining supply chain success, supply chain professionals have identified the significance of information management system and are focussed on exploring the best way for data base management and the proper usage of it for better business decisions^[5]. Artificial intelligence (AI) has been adopted with this purpose, but fully not utilised in the area of SCM. Generally AI is mentioned as the usage of computers with the purpose of reasoning, as well as identifying patterns, learning from experience, acquiring and retaining knowledge, and developing various forms of inference to solve problems in decision-making situations where optimal usage of resources are expensive and hard to produce^[2].

The main area where AI's potential application that has not yet been fully exploited is the emerging management philosophy of SCM, which requires effective and efficient handling of complex, interrelated decision-making processes and the creation of intelligent knowledge bases needed for critical problem solving^[4]. Different stages of joint demand planning and forecasting processes in the SC process can be easily accessed using AI. This paper analyses the beneficial status as well as major drivers, challenges and the outcome of implementation of AI in various sub-fields of AI such as expert systems and agent-based systems that can be used for dealing with various aspects (e.g., warehousing, joint demand planning, inventory control) of the SC^[6].

OBJECTIVES OF THE STUDY

- To determine the benefits of replacing manual system with Artificial Intelligence.
- To analyse the current status of Artificial Intelligence adoption in supply chain management.
- To ascertain the major drivers for the implementation of Artificial intelligence in organization.
- To identify the areas where Artificial intelligence can be applied in supply chain management.
- To recognise the challenges for acquiring Artificial intelligence in supply chain management.

II. SCOPE OF THE STUDY

The study provides a clear understanding about the awareness level about this technology and the view about the beneficiary in adopting artificial intelligence. The primary reason that strongly recommends AI

implementation as well as the key areas were artificial intelligence adoption can be adopted were identified. The major challenges in acquiring of this technology revealed, that opens a huge area of exploitation of this technology in supply chain management

The scope of the study is categorised with respect to the three-level decision-making hierarchy: (a) strategic decisions that meant for long-term as well as executive-level issues such as strategic alliances, facility location, technology power and capital investment; (b) tactical decisions that deal with intermediate term, mid-manager-level issues such as joint demand planning, supplier selection, and inventory planning and(c)operational decisions that deal with short term ,routine issues such as vehicle routing, order picking, and cycle counting.

LIMITATIONS OF THE PROBLEM

The main limitations of the study are,
It is limited to the field of supply chain alone.
The accuracy level of the data provided by the respondents is not known.
The sample size is limited numbers only.
This study has been conducted at Coimbatore only.

THEORETICAL BACKGROUND OF THE STUDY

OBJECTIVES OF AI

The main objectives of AI are to understand the phenomenon of human intelligence and to design computer systems that can mimic human behavioural patterns and create knowledge relevant to problem-solving^[3]. The potentiality of AI in learning and comprehending new concepts and developing their own inferences from experience as well the skill of reasoning, developing conclusions and interpretation makes it dominant one. The main objective of AI is the high performance compared to manual replacement, accuracy as well as perfection in the area of adoption makes AI the preferred technology.

IMPLEMENTATION STATUS

Since SC managers may be interested in determining the applicability of the proposed AI technique, we included the third dimension of the categorization indicating whether the proposed AI technique has been applied to the real-world decision environment using actual data, and whether the AI technique was successfully implemented in the SC setting.

THE KEY AREAS OF AI APPLICATIONS IN SCM

Even though AI was adopted in various applications in different sectors of management, the potential of AI was not fully exploited in SCM. With the increased demand for accuracy and perfection now a days requires the AI implementation in the SCM area. The key areas were AI can make its influence in SCM issues involves inventory management, inventory control and planning, purchasing, location planning, freight consolidation, and routing/scheduling problems including transportation

network design, demand planning and forecasting, order picking issues and in customer relationship management^[7]

CHALLENGES FOR AI APPLICATIONS

Challenges for AI applications^[1] to SCM include:

- Excessive dependence of AI on computer programme and it lacks emotional intelligence and will perform only on the base of its instruction set.so if not carefully handled may turn into disaster.
- AI software solutions are complex ones and it will be difficult for a normal person to operate
- High implementation cost for AI holds another challenge in adoption
- Lack of proper technology needed for implementation is the another barrier in the way of AI

III. RESEARCH METHODOLOGY

Both primary and secondary data were used for the present study. Convenient random sampling method has been used for this study. Secondary data have been collected from Websites, Records and Journals. SCM Professionals from Coimbatore city are involved in this study. The data required for the study have been collected through the structured questionnaire. 50 respondents were deliberated for the study purpose.

TOOLS FOR ANALYSIS :Percentage Analysis, chi-square analysis, weighted Average, Mean and Standard deviation and pearson’s correlation

IV. ANALYSIS AND DISCUSSION

Table 1: Percentage Analysis

Content	Factors	Percentage(%)
Awareness status	Yes	79
	No	21
Beneficial level	Excellent	22
	Good	63
	Moderate	9
	Low	6
Primary reason of adoption	Automated decision making	34
	Eliminating manual costs	16
	Eliminating manual errors	30
	Automated data reporting	17
	Others	3
Major drivers	Performance or transparency	13
	Automation	60
	Processing power	10
	Technology war	17
Challenges in adoption	Shifting of roles	21
	Lack of emotional intelligence	45
	Lack of skilled man	22

	power	
	Access of data	12
Barriers in adoption	High implementation cost	59
	No improvement with experience	7
	Unemployment	8
	No creativity	7
	Lack of technology power	19
Best strategy	AI adoption	83
	AI reduction	17

Interpretation: - Out of total respondents about 79% of respondents were aware about the technology. Most of the respondents (63%) opinioned that the beneficial status in AI adoption is good. The primary reason for AI adoption was found out to be automated decision making (34%) and elimination of manual errors(30%). Majority of respondents (60%) selected automation as the major driver for AI adoption. Among the challenging factors, lack of emotional intelligence was recognized as the main challenge (45%). Based on the opinion of 59% of respondents, high implementation cost was the main barrier in adoption of AI. Most of the respondents (83%) believe that adoption of AI is the best strategy for organizational success.

Table 2: weighted average

Key benefits in AI adoption

Key benefits	Mean	Rank
Predictive analysis	3.32	4
Reduction of time and cost	2.70	1
Improved quality	2.91	3
Easiness of operation	2.85	2
Accuracy	3.48	5

Interpretation:-Among the key benefits of artificial intelligence, reduction of time and cost ranked first,

Interpretation :- Among the key factors ,preference reasons is found out to be first with a mean value of 3.53 and with variance value of 1.907.

Table : 5 Pearson’s Correlation

	awareness	Level of awareness	Best strategy	Challenges in adoption	Major drivers	PrefereneReason
Awareness	Pearson	1	.688**	.118	.307	.497**
	Correlation					
Level of awareness	Sig. (2-tailed)		.000	.534	.099	.005
	Pearson	.688**	1	.279	.171	.444*
Best strategy	Correlation					
	Sig. (2-tailed)	.000	.136	1	.367	.014
Challenges in adoption	Pearson	.118	.279	1	.177	.563**
	Correlation					
Major drivers	Sig. (2-tailed)	.534	.136	.350	.001	.852
	Pearson	.307	.171	.177	1	.426*
PrefereneReason	Correlation					
	Sig. (2-tailed)					

whereas easiness of operation ranks second, improvement of quality turned to be in third position. Predictive analysis stood in fourth rank and accuracy was the least with fifth rank.

V. CHI SQUARE ANALYSIS

To find the relationship between level of awareness and best strategy for organizational success.

H0 : There is no significant association between level of awareness and best strategy for organization success.

Table 3: chi square analysis

Level of awareness VS Best strategy

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.091 ^a	3	.003
Likelihood Ratio	15.604	3	.001
Linear-by-Linear Association	2.250	1	.134
N of Valid Cases	50		

Interpretation :-Since Value of P < 0.05, we reject null hypothesis and accept alternative hypothesis. So there exist a relationship between level of awareness and best strategy.

Table :4 Mean and Standard deviation

	Mean	Std. Deviation
Awareness	1.23	.430
Level of Awareness	2.17	.913
Best strategy	1.20	.407
Challenges in adoption	3.33	.959
Major drivers	2.77	1.716
Preference reason	3.53	1.907

Major drivers	Sig. (2-tailed)	.099	.367	.350		.019	.947
	Pearson	.497**	.444*	.563**	.426*	1	-.066
	Correlation						
	Sig. (2-tailed)	.005	.014	.001	.019		.729

Interpretation :-

- Awareness, level of awareness and major drivers are highly correlated.
- Best strategy and major drivers are highly correlated to each other

VI. FINDINGS

- Most of the respondents have awareness about AI.
- Majority of the respondents believes the beneficial status as good.
- Automated decision making and elimination of manual errors are the primary reason of adoption.
- Automation is the major driver for AI implementation.-
- Lack of emotional intelligence is the major issue in AI adoption.
- High implementation cost was found out to be the major barrier in AI implementation in supply chain management
- Adoption of AI in SCM is the best strategy for organisational success
- Among the key benefits of artificial intelligence, reduction of time and cost ranked first
- There is significant relationship between awareness and best strategy for organisation.
- Among the key factors ,preference reasons is found out to be first with a mean value of 3.53
- Awareness ,level of awareness, major drivers and best strategy are highly correlated to each other

VII. SUGGESTIONS

For adoption of highly advanced technology like AI in SCM, requires proper structured planning as well as human and technology resources for handling it. So, it is increasingly important for SC partners to update their knowledge bases and automate the SC decision-making processes. Thus, AI has been put forward as an effective managerial aid tool that helps the firm to connect its customers, suppliers, and SC under the same roof. So proper awareness and technical developments should be developed for proper implementation.

VIII. CONCLUSION

Now a days SCM is one of the booming areas of business where advanced technology is required. AI with its wide acceptance and efficiency can be adopted in key areas of SCM. The study analyse the awareness level towards the technology and its impact on various aspects of supply chain management. The study explored the key areas where AI can be adopted. The major drivers and challenges in

implementation of AI is analysed and pointed out with an aim of supply chain effectiveness. AI can be fully utilised to solve SC problems whose solutions are either too expensive or difficult to produce by proper usage in particular areas of SCM. Allocating AI in the key areas of SCM will result in an efficient and effective SCM network. By adopting proper measures to overcome the limitations of AI implementation, AI will be the best key for success of SCM in future operations. The study decides the best strategy for organisational success is in the adoption of Artificial Intelligence. Thus it is concluded that Artificial Intelligence is going to conquer the future of supply chain with its efficiency and effectiveness.

IX. REFERENCE

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