Literature Review
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Industry Report on Adoption of AI and Machine Learning-A Strategic Framework Approach

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Abstract

This research article is an attempt to conduct a comprehensive industry analysis on AI adoption strategies by conducting an industry analysis based on various strategic frameworks, including the BCG-matrix, GE-McKinsey matrix, GE nine box matrix, balanced scorecard, and others. The objective is to gain strategic big picture on Industry clusters based on AI adoption by organizations and implementing artificial intelligence technologies effectively and provide recommendations for decision making on investments, innovation, product development and consumer insights.

Keywords: AI adoption • Strategic frameworks • BCG-matrix • GE-McKinsey matrix • GE nine box matrix • Balanced scorecard • Global industry analysis • Comparative analysis • Organizational behavior • Performance evaluation • Decision making • Product development and innovation • Customer behavior • Industry clusters

Introduction

Conduct an extensive review on industry reports, and case studies on AI adoption strategies and the application of strategic frameworks. Gather industry data from case studies, financial data, and annual reports etc.

Global industry analysis: Analyze the AI adoption strategies employed by organizations across different industries using the BCG-matrix, GE-McKinsey matrix, GE nine box matrixes, balanced scorecard, and other relevant strategic frameworks [1].

Conduct in-depth analysis of selected organizations to provide detailed insights into their AI adoption strategies and the application of strategic frameworks and future recommendations [2].

Research questions

- Organizational decisions to prioritize and allocate resources for AI adoption based on the BCG-matrix and GE-McKinsey matrix?
- Organizational decisions to assess and manage the potential risks and benefits associated with AI adoption using the GE nine box matrix?
- Organizational decisions to measure and evaluate the performance and impact of AI adoption through the balanced scorecard framework?
- Key strategic industry practices for industry clusters for formulating and executing AI adoption strategies?

Expected outcomes

Practical insights: Provide valuable insights and best practices for organizations worldwide in formulating and implementing AI adoption strategies through the application of strategic frameworks.

Comparative analysis: Compare and contrast the AI adoption strategies employed by organizations across different industries, highlighting key considerations based on internal processes perspective, learning and growth perspective, decision making, automation, personalization and consumer experience, product development and innovation.

Performance evaluation: Demonstrate how the balanced scorecard framework can be utilized to measure and evaluate the performance and impact of AI adoption initiatives and future recommendations based on organization clusters.

Risk assessment: Illustrate the use of the GE nine box matrixes in assessing and managing the risks associated with AI adoption [3].

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Literature Review

Balanced scorecard as a strategic management tool to assess AI/machine learning initiatives helps in identifying areas of improvement, setting targets, and tracking progress over time. This approach enables companies to ensure that, their AI initiatives contribute to the organization's long-term success and drive sustainable value creation.

Internal processes perspective

- Identify key internal processes that can benefit from AI/ machine learning, such as automation, predictive analytics, or optimization.
- Measure the efficiency and effectiveness of AI-driven processes.
- Track process improvements and cost savings resulting from AI implementation.

Learning and growth perspective

- Evaluate the organization's AI/machine learning capabilities, including talent acquisition and development, technology infrastructure, and data management.
- Assess the organization's ability to adapt and learn from AI initiatives.
- Measure employee engagement and satisfaction related to AI adoption (Table 1).

Balanced scorecard analysis: High, medium, and low performance metrics

Internal process perspective		Leaning and growth perspective	
High	Apple inc.	High	Apple inc.
	Samsung electronics Co., ltd.		Samsung electronics Co., ltd.
	Google LLC		Google LLC
	Microsoft corporation		Microsoft corporation
	Amazon. Com, Inc.		Amazon. Com, Inc.
	IBM corporation		IBM corporation
Medium	Intel corporation	Medium	Intel corporation
	Huawei technologies Co., ltd.		Huawei technologies Co., ltd.
	Dell technologies Inc.		Dell technologies Inc.
	HP Inc.		HP Inc.
	Siemens AG		Siemens AG
	Oracle corporation		Oracle corporation
	NVIDIA corporation		NVIDIA corporation
	Ericsson AB		Ericsson AB
Low	Cisco systems, Inc.	Low	Cisco systems, Inc.
	Sony corporation		Sony corporation
	Toshiba corporation		Toshiba corporation
	LG elecronics inc.		LG electronics inc.
	Panasonic corporation		Panasonic corporation
	Xiaomi corporation		Xiaomi corporation
	ASML holding N. V.		ASML holding N. V.
	Applied materials, inc.		Applied materials, inc.
	SAP SE		SAP SE
	Fujithsu limited		Fujithsu limited
	Infineon technologies Ag		Infineon technologies Ag
	NXP semiconductors N. V.		NXP semiconductors N. V.
	Texas instruments incorporated		Texas instruments incorporated
	Adobe inc.		Adobe inc.

	Sales force. Com, inc.		Sales force. Com, inc.

Table 1. Balanced scorecard analysis-High, medium, and low performance metrics.

Enhanced decision-making

AI/machine learning algorithms can analyze vast amounts of data, identify patterns, and generate insights that support informed decision-making. Thus organizations are enabled to make choices backed by data driven analysis and strategic insights based on evidence, leading to improved outcomes and reduced risks [4].

Efficient automation

AI/machine learning technologies can automate routine tasks, streamline processes, and optimize resource allocation. By reducing manual efforts and augmenting human capabilities, organizations can achieve greater efficiency, productivity, and cost savings.

Personalization and customer experience

AI/machine learning enables companies to analyze customer data and preferences, delivering personalized recommendations, tailored products/services, and personalized marketing campaigns. This fosters customer satisfaction, loyalty, and engagement.

Innovation and product development

AI/machine learning techniques facilitate rapid experimentation, prototyping, and iterative improvement of products and services [5]. They enable organizations to uncover new insights, develop innovative solutions, and create competitive differentiation (Tables 2 and 3).

Balanced scorecard analysis: High, medium, and low performance metrics			
Financial perspective		**Customer perspective**	
High	Apple inc.	High	Apple inc.
	Samsung electronics Co., ltd.		Samsung electronics Co., ltd.
	Google LLC		Google LLC
	Microsoft corporation		Microsoft corporation
	Amazon. Com, Inc.		Amazon. Com, Inc.
	SAP SE		SAP SE
	Sales force. Com, inc.		Sales force. Com, inc.
	Adobe inc.		Adobe inc.
	Qualcomm incorporated		Qualcomm incorporated
Medium	Intel corporation	Medium	Intel corporation
	IBM corporation		Huawei technologies Co., ltd.
	Dell technologies Inc.		Dell technologies Inc.
	HP Inc.		HP Inc.
	Oracle corporation		Oracle corporation
	NVIDIA corporation		NVIDIA corporation
	Ericsson AB		Ericsson AB
	Huawei technologies co., ltd.		Huawei technologies co., ltd.
	Cisco systems, Inc.		Cisco systems, Inc.
	Sony corporation		Sony corporation
	Toshiba corporation		Toshiba corporation
	LG electronics inc.		LG electronics inc.
	Panasonic corporation		Panasonic corporation

Xiaomi corporation		Xiaomi corporation
ASML holding N. V.		ASML holding N. V.
Applied materials, inc.		Applied materials, inc.
Fujithsu limited		Fujithsu limited
Infineon technologies Ag		Infineon technologies Ag
NXP semiconductors N. V.		NXP semiconductors N. V.
Texas instruments incorporated		Texas instruments incorporated
Sales force. Com, inc.		Sales force. Com, inc.

Table 2. Balanced scorecard analysis: High, medium, and low performance metrics.

BCG matrix analysis: Stars, cash cows, question marks, and dogs	
Stars	**Cash cows**
Apple Inc.	Google LIC
Microsoft corporation	Amazon. Com, inc.
NVIDIA corporation	SAP SE
Qualcomm incorporated	Adobe inc.
Question marks	**Dogs**
Huawei technologies co., ltd.	Sony corporation
Xiaomi corporation	Toshiba corporation
ASML holding N. V.	LG electrons inc.
Infineon technologies AG	Ericsson AB
NXP semiconductors N. V.	Fujitsu limited
Texas instruments incorporated	Panasonic corporation
	Dell technologies inc.
	HP inc.
	Siemens AG
	Cisco system, inc

Table 3. BCG matrix analysis: Stars, cash cows, question marks, and dogs.

Discussion

Evaluation of the growth potential and market share of companies in each category

Stars: "Stars" category companies are characterized with high market growth potential and high market share. These companies have made significant investments in AI/machine learning and have established themselves as leaders in the industry. They have strong financial resources and a track record of successful innovation, allowing them to capitalize on the growth opportunities in the AI space [6].

Cash cows: "Cash cows" category companies are characterized with low market growth potential and high market share. These companies have already established a dominant position in the market and generate substantial revenue from their existing AI/machine learning offerings. They have a solid customer base and can leverage their strong financial position to invest in further advancements and expansion of their AI capabilities.

Question marks: "Question marks" category companies are characterized with high market growth potential and low market share. These companies are investing in AI/machine learning but have yet to achieve significant market penetration. They face competition from established players but have the opportunity to differentiate themselves through innovation and strategic partnerships.

Dogs: "Dogs" category companies are characterized with low market growth and low market share. These companies have limited investments in AI/Machine Learning and struggle to compete with the market leaders. They face challenges in terms of innovation, customer adoption, and financial resources. Strategic considerations are needed to determine if there are opportunities for turnaround or if divestment is a more suitable option.

Strategic recommendations for companies in each quadrant to maximize their AI/machine learning capabilities

Stars

- Should have sustained investment in research and development for maintaining a competitive edge in AI/machine learning.
- Foster collaborations with academia, startups, and industry experts should foster collaborations and partnerships for driving innovation and for exploring new applications.
- Enhance customer experience by leveraging AI to personalize products and services. Expand into new markets and industries by leveraging AI capabilities.
- Continuously upgrade infrastructure and talent pool to support advanced AI algorithms and technologies.

Cash cows

- Focus on sustaining and optimizing existing AI/machine learning offerings to maintain market leadership.
- Explore opportunities for incremental innovations and improvements to enhance customer value.
- Leverage the financial strength to invest in acquisitions or strategic partnerships to expand AI capabilities.
- Optimize operational efficiency and cost structure to maximize profitability.
- Develop a roadmap for diversification into new AI-based products or services to capture emerging market trends.

Question marks

- Conduct in-depth market research to identify niche segments with high growth potential. Invest in talent acquisition and development to build AI expertise.
- Foster partnerships with early adopters and industry influencers to gain market traction. Develop agile and flexible business models to adapt to evolving market dynamics.
- Continuously monitor and evaluate the performance of AI initiatives to make informed investment decisions.

Dogs

- Evaluate the potential for strategic partnerships or collaborations to access AI capabilities.
- Consider divestment or exit strategies for underperforming AI initiatives.
- Focus on core competencies and areas where the company has a competitive advantage. Explore opportunities for technology licensing or joint ventures to monetize existing AI assets.
- Develop a long-term strategic plan for transitioning the business towards higher growth areas outside of AI/machine learning (Table 4).

	High growth	Medium growth	Low growth
High potential	Apple inc.	Intel corporation	Toshiba corporation
	Samsung electronics	IBM corporation	Panasonic corporation
	Google LLC	Hauwei technologies	Xiaomi corporation
	Microsoft corporation	Sony corporation	ASML holding N. V.
	Amazon. Com, inc.	Dell technologies	Applied materials
Medium potential	Cisco systems	LG electronics	Fujitsu limited
	Oracle corporation	NVIDIA corporation	
	Siemes AG	Ericsson AB	
	Toshiba corporation	SAP SE	
	Panasonic corporation	Qualcomm incorporated	
	Xiaomi corporation	Infineon technologies	
	ASML holding N. V.	NXP semiconductors N.	
	Fujitsu limited	Texas instruments incorporation	
	Salesforce. Com. Inc.	Adobe inc.	
Low potential	-	-	-

Table 4. This diagram illustrates the relative positioning of the companies based on their AI/machine learning investments.

This diagram illustrates the relative positioning of the companies based on their AI/machine learning investments. The leaders are positioned in the high-growth, high-market share quadrant, and the challengers in the medium-growth, high-market share quadrant, the followers in the medium-growth, low-market share quadrant, and the laggards in the low-growth, low-market share quadrant.

This framework helps assess a company's strategic position by evaluating its business units based on industry attractiveness and competitive strength. In the context of AI/machine learning adoption, the nine-box matrix can identify companies as leaders, challengers, followers, or laggards based on their current initiatives and market positioning (Tables 5-7).

High market presence	Medium market presence	Low market presence
Google	IBM	Cognizant
Microsoft	Salesforce	NVIDIA
Amazon	oracle	Open AI
Facebook	SAP	Nuance
Apple	Adobe	Splunk
Baidu	Intel	Automation anywhere
Tencent	Accenture	Uipath
Alibaba	Infosys	Palantir
IBM	Wipro	Robotic process automation
Samsung	Teradata	Thought spot
Huawei	Dell	Data robot
Qualcomm	Hitachi	H20. AI
ZTE	NEC	Rapid miner
LG electronics	Fujitsu	Dataiku
Sony	Toshiba	Alteryx

Table 5. This framework helps assess a company's strategic position by evaluating its business units.

High market attractiveness high competitive position	Medium market attractiveness medium competitive position
Google	Amazon
Microsoft	IBM
Facebook	Sales force
Apple	Baidu
NVIDIA	Tencent
Open AI	Oracle
Intel	Accenture
Samsung	SAP
Alibaba	Adobe
IBM	Intel
Huawei	Dell
Qualcomm	Wipro

Tencent	Infosys
ZTE	Teradata
LG electronics	NEC
Sony	Hitachi

Table 6. GE matrix: AI industry top 30 companies.

	High business strength	Low business strength
High market attractiveness	**Stars**	**Question marks**
	Apple inc.	Huawei technologies co.,
	Samsung electronics	Xiaomi corporation
	Google LLc	ASML holding N. V.
	Microsoft corporation	SAP SE
	Amazon. Com. Inc.	Qualcomm incorporation
	Salesforce. Com, inc.	Infineon technologies AG
Low market attractiveness	**Cash cows**	**Dogs**
	Intel corporation	Sony corporation
	IBM corporation	Dell technologies inc.
	Cisco systems, inc.	HP inc.
	Oracle corporation	Siemens AG
	Adobe inc.	Toshiba corporation
		LG electronics corporation
		Panasonic corporation
		Ericsson AB
		Fujitsu limited
		NXP semiconductors N. V.
		Texas instruments inc.
		Applied materials, inc.

Table 7. GE matrix: Top 30 AI/machine learning companies.

GE matrix showcasing the top industry companies, on the basis of their market presence and innovation, company's business analyzed based on their market attractiveness competitive position.

GE/McKinsey matrix is a strategic tool used for portfolio analysis, represented as a 2 × 2 matrix with market attractiveness on one axis and Business Strength on the other axis. Based on the positioning in the four quadrants.

Cows (Low market attractiveness, high business strength): Dominant market share, comparatively slower growth. Require less investment and generate cash flow for the organization.

Dogs (Low market attractiveness, low business strength): Low market share, low growth potential may drain resources and hence require careful evaluation for divestment.

Questions (High market attractiveness, low business strength): Operate in high market attractiveness, but have not reached profitability or strong market position, and require strategic investments.

Stars (High market attractiveness, high business strength): Stars experience rapid growth and make gains with substantial profits. Stars require continuous investments to sustain long term growth and profitability.

Conclusion

The study draws on excellent practical insights from top Industry companies decision making, comparative analysis for industry

benchmark and best practices, including measuring and evaluating the performance and impact of AI adoption initiatives, future recommendations based on organization clusters and recommendations for investment or divestments based on risk analysis and assessment. Thus, this study provides a very good direction for organizational middle and top management for their C-level decision making and recommendations. The study also provides a high level assessment for the opportunities for management consultancies and executive recruiters and human resources for their future recruitment initiatives.

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