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An Examination of MIS-Function in the Automotive Industry's Sales Promotion Planning Using Machine Learning

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Abstract

The way people want things and new tech is making a big change in the car business. The use of Machine Learning (ML) in marketing intelligence services has improved sales promotion planning, which is a crucial part of this transformation. This paper looks at how car companies use machine learning to understand the market and make better decisions. The tools and methods that marketers use to study the market, the customers, and the competitors collect, analyze, and interpret the data. In the car business, its super important to collect tons of data and then figure out what it means to stay ahead of the game and meet what people want. We can use data and computers to guess what customers want and do with almost no mistakes. Marketing intelligence services (MIS) is used in different parts of the car business, like figuring out who to sell to, how much to charge, how much to have in stock, and how to advertise. These facets are enhanced by using ML to provide deeper, more actionable insights.

Keywords— Automotive Industry, Marketing Strategies, Machine Learning, Sales Promotion

Introduction

Karl Benz invented the internal combustion engine in 1886, which marked the beginning of the automotive industry. The engine's speed regulation and epicyclic gearbox were enhanced by notable engineers such as Frederick W. Lanchester.

For the wealthy, small businesses produced pricey handcrafted cars; but, Henry Ford's introduction of mass-produced vehicles made automobiles more accessible and well-liked. As a result, in the early 20th century, the Ford Model T emerged as the most well-liked automobile [1]. Traditionally, automakers have utilized flow production line systems to save costs and turnaround times; Toyota, on the other hand, has adopted a lean manufacturing strategy to increase productivity. Nonetheless, the transition from gas-powered to electric cars has affected production techniques; Tesla, for example, has embraced the 'Giga Press' die-casting technique to streamline body parts [2]. Automakers have launched cellular manufacturing systems (CMS) to stay ahead with minimal setup time and improved quality in order to satisfy the demands for high-mix flexible-volume production. Mercedes-Benz uses the 'cube' cellular production technology to process different models and components starting with body assembly. Adding more production stages to cellular manufacturing systems could aid in addressing the model cycle's constant shortening as well as structural changes in electric mobility [3]. Globally, the increasing number of people driving has resulted in environmental issues such declining air quality, depletion of the ozone layer, and climate change. Internal combustion engines (ICEVs), which run mostly on petroleum fuel, power the majority of cars. Global petroleum supplies are being depleted as a result of this excessive use. Automakers are refocusing on electric cars (EVs) in order to overcome these problems [4]. We should use more electric vehicles (EVs) to save fuel and reduce the bad stuff that comes out of them, like carbon dioxide and other harmful gases, to make the air cleaner and cooler. The government's incentives have caused more people to buy electric cars. To keep up with the fast-changing car industry, which is affected by things like global trade, different types of customers, and more kinds of products, companies need to use digital transformation strategies. It's going to take some new moves, doing what you like, and making models shorter. Nowadays, cars are super important and digital stuff is making them even better. It's important to have features like customized drivers, services that know where you are, and being able to connect with other drivers. One cool thing is that the cars can drive by themselves, which means they can move and steer without us [6].

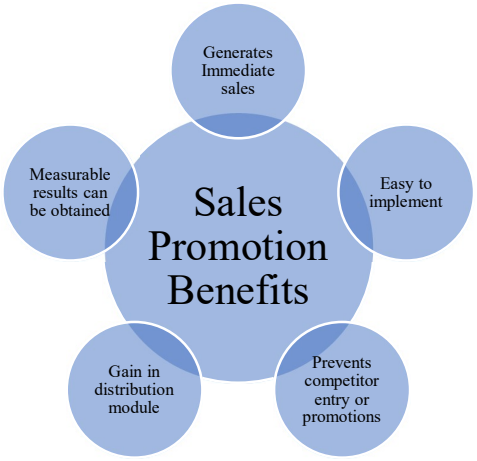

Fig. 1: Importance of sales promotion benefits

Product portfolio-management is an essential marketing tactic used by businesses to control costs, satisfy a wide range of customer-demands, and stay ahead of the competition. New product launches, R&D expenditures, and market penetration are examples of innovative actions that often enhance company performance. These choices, meanwhile, may also have unfavorable effects, such expensive development expenses, a danger of cannibalization, and trouble spotting emerging trends. These choices are greatly influenced by brands and branding strategies because they offer informational cues that lower ambiguity and minimize risk [7]. To optimize market performance, multi-brand and multi-product companies in innovative industries need to manage and optimize their product and brand portfolios. On the other hand, it is unclear from earlier research how these traits connect to one another and to company performance. Pakistan's automotive sector is expanding quickly as new domestic and foreign businesses join the market. Car manufacturers need to use sales promotion and other efficient marketing techniques to draw in customers and boost sales. These tactics, which might be direct or indirect, consist of sales promotion and advertising. Promotion of sales, a short-term branding tactic, provides motivations like coupon codes and discounts, while advertisements, a paid form of impersonal promotion, can take many different forms as shown in Fig.1. Car manufacturers frequently employ both tactics to boost sales and build brand awareness [8].

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The automotive sector has embraced big data technological advances since it allows for precise understanding of customer needs and influences their purchasing decisions. Employing the technological benefits to engage with consumers and effectively influencing how they make purchases is the foundation of big data marketing, which improves industry performance overall [13]. The effect of thinking strategically on intelligence regarding competition in highly competitive businesses is investigated in [14]. It looks at the competitive intelligence process, which entails methodically gathering data on rivals, as well as the cognitive processes of strategic thinking, which include system thinking, creativity, and vision. 628 executives from three communications and five automobile industries provided the data in [14]. The results imply that competitive intelligence is positively influenced by strategic thinking abilities. In the automobile sector, PT. XYZ, a vehicle retail company with 26 outlets and more than 150 salespeople, suffers fierce competition.

Understanding Marketing Intelligence Services

AI is changing data-driven, automated, and intelligent tactics, which in turn is changing marketing strategies as depicted in Fig.2. Marketing solutions driven by AI are able to change with the needs of the business and provide profitable communication and solution bundles. The 5Ps paradigm for the marketing mix was proposed by the CEO of the Marketing Artificial Intelligence Institute. AI-powered marketing has attracted attention among researchers, but a targeted, case-driven study is needed to condense the effect analysis technique down to functional themes and sub-activity levers within marketing [9]. Small and medium-sized businesses (SMEs), which made up 97.3% of all business establishments in Malaysia in 2017, are essential to the country's economic development and job prospects [10]. In order to expand, the government encourages SMEs to look into foreign markets. However, in order for SMEs to compete with other industry players, they must have a competitive advantage [11]. In an effort to increase workflow efficiency, the Thai corporation is creating a business intelligence system. For predictions of sales, the system generates a product lifecycle curve by examining market demand and supply components. By streamlining the conventional preparation of information procedure, this technology frees up staff members to concentrate on their work. To assist in decision-making, promote communication, and increase team productivity and efficiency, an intelligence dashboards is developed in [12]. For Thailand's automobile and automotive component sectors, this strategy is essential.

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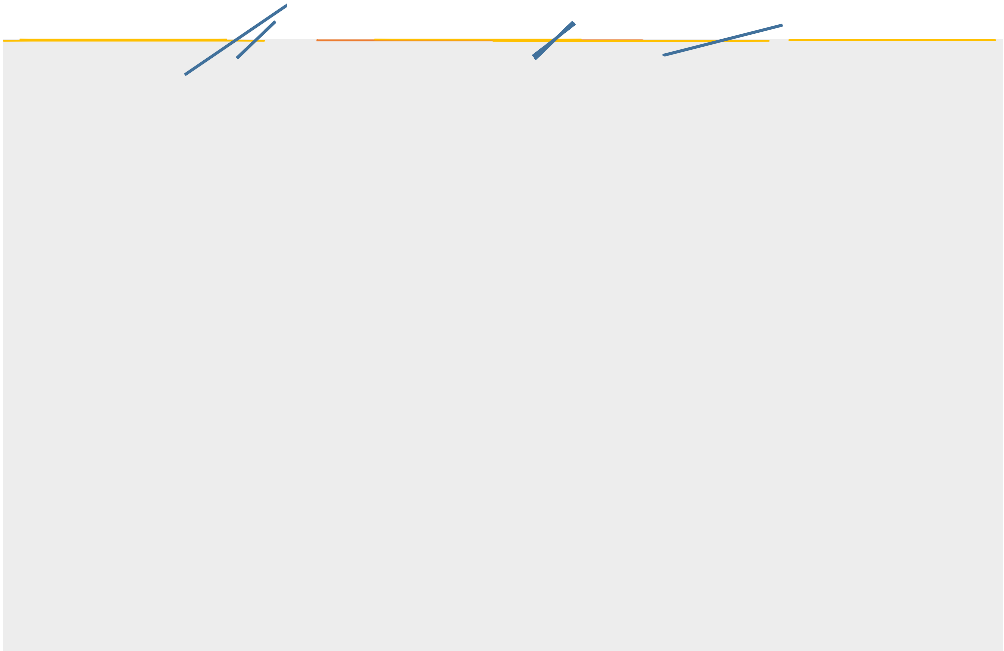

It takes two to three days to decide on prices, reductions, and promotions, which could result in a loss of business and orders. Long communication chains cause salespeople to lose three to five orders every month. A marketing intelligence system with business intelligence support is required to increase productivity and effectiveness. Important steps in this process include data collecting, interviews, application design, and design of the data house and dashboard [15]. In the Denpasar automobile business, the study in [16] looks on the connections between marketing information systems, service quality, customer happiness, and customer loyalty. The findings indicate that while service quality greatly increases client loyalty, marketing information systems have a beneficial impact on it. Loyalty is also significantly impacted by customer satisfaction. Thus, in order to assist businesses survive the Covid-19 era, marketing information systems are essential for preserving client loyalty, which is aided by service quality and satisfaction. With a distinctive eight-decade history, the Iranian automotive sector contributes significantly to the country's economy. To identify the critical elements influencing marketing intelligence, a conceptual model utilizing the ISM technique was provided in [17]. Ten authorized marketing intelligence variables were displayed in the results, which were divided into six levels: information vendors, governmental agencies, monitoring online communications, final outcomes, and information collected from other contributors. The foundation of marketing intelligence is the nation's priority element. In Mansoura City, the study in [18] looks at how marketing information systems affect market share and sales growth for tourism-related businesses. A strong positive correlation between MIS and increased revenue and shares of market was discovered by the research team using positivism, a deductive methodology, and quantitative analysis. Nonetheless, notable distinctions were discovered among staff members concerning variables including the age of the business, level of education, and years of experience, implying the want for additional investigation. This study uses a scientometrics-based assessment of information system to investigate patterns of development in the market for electric automobiles. Three primary subjects are identified: integration, climate change, and car exhaust pollution. The study in [19] emphasizes the value of stakeholders and suggests a mechanism for involving them in order to address issues related to sustainable development. The system contributes to stakeholder synergy and resource optimization by revealing driving forces, agreements, consequences for policy, consumption drivers, and prerequisites for technological innovation.The goal of the study conducted in [20] is to give automakers a conceptual framework for successfully integrating marketing flexibility in a market that is changing quickly. Based on a survey of the literature and case studies, the paper examines actual situations and draws conclusions regarding the need of flexible marketing strategies for automakers. The results imply that firms with flexible marketing strategies are better able to manage both the long-term risks posed by the dynamic business environment and the short-term variations in demand.

TABLE 1. COMPARES VARIOUS STUDIES ON THE INTEGRATION OF TECHNOLOGY AND MARKETING INTELLIGENCE IN THE AUTOMOTIVE INDUSTRY

Study Ref	Adopts Advanced Tech (✅/❌)	Effective Data Utilization (✅/❌)	Positive Strategic Impact (✅/❌)	Successful Business Outcomes (✅/❌)	Key Insights
[13]	✅	✅	✅	✅	Embraces big data to understand customer needs and enhance sales, showing effective integration and application of technology.
[14]	❌	✅	✅	✅	Focuses on strategic thinking impacting competitive intelligence, though not directly linked to advanced tech application.
[15]	✅	✅	✅	✅	Implements a comprehensive MIS with BI support effectively, improving decision-making and productivity in a competitive market.
[16]	✅	✅	❌	✅	Uses MIS to link service quality to customer loyalty, though the strategic impact on broader business goals is less clear.
[17]	❌	❌	✅	❌	Theoretical model using ISM technique to define MI elements, lacking in technological application and direct business outcomes.
[18]	❌	✅	❌	✅	Analyzes MIS impact on business metrics without direct tech advancement, but achieves significant market share growth.
[19]	✅	❌	✅	❌	Focuses on stakeholder engagement and sustainability in EV market, but lacks effective data utilization or technology use.
[20]	✅	❌	✅	✅	Proposes a flexible marketing framework to adapt to market changes, not centered on technology but strategically sound.

Using symbols to indicate best practices and effectiveness, table 1 compares various studies on the integration of technology and marketing intelligence in the automotive industry. As a result, studies like [13] and [15] demonstrate that

advanced technology is widely adopted, data is effectively utilized, positive strategic effects have been achieved, and successful business outcomes have been achieved. To enhance industry performance and decision making, big data and marketing intelligence systems can be effectively used. Unlike studies like [17] and [19], which focus on stakeholder engagement and theoretical models without integrating or utilizing technology, [17] and [19] have limitations in terms of technology adoption and direct business outcomes. It provides a clear metric for evaluating how well each study's approach integrated technological advances with strategic business objectives, indicating which studies excelled and which did not.

Role of Machine Learning in Marketing Intelligence

The automobile sector relies heavily on accurate demand forecasting to help with cost reduction, resource optimization, sales and manufacturing planning, and overall business success. On the other hand, poor projections may result in expensive labor, surplus inventory, production supply problems, and reputational harm. Throughout tax revenues, revenue generation, and improvements in technology, the automotive industry makes a considerable contribution to the global economy through its intricate strategic partnerships [21].The stock market is extremely erratic and is impacted by internal, external, political, and financial variables. Because stock values are so volatile, making predictions about them from past data is difficult. In order to forecast future stock prices, the research in [22] suggests a machine learning model that makes use of historical stock price data and financial news. Sentiment ratings were computed using three different methods, and trials were run using financial news and stock price data spanning 10 years from four distinct companies. For ten days, the model's accuracy for both current and future trends was at its greatest, 0.90. The results of the experiments also showed that the stock prediction for Tata Motors had the greatest MAPE and diverged further from actual projections. Using applications of artificial intelligence and machine learning, Industry 4.0 presents manufacturing organizations with chances to increase their competitiveness and operational efficiency. One of the first industries to use these technologies is the automotive sector, which uses innovative data processing architectures for data analytics. One-time raw material optimization, real-time industrial robot anomalous behavior detection, and real-time quality prediction are the three use cases. In addition to identifying product quality, data analytics helps expedite production, cut waste, and enhance overall product quality [23]. Moreover, this technology can assist in controlling intricate robots made by various manufacturers.Machine learning and data sciences are becoming vital tools for the automobile sector as it uses them to optimize processes and products. The automotive value chain's sub processes are utilizing these technologies, and their transformational potential is demonstrated by their futuristic application cases. These developments could boost output and reinforce the industry-wide consumer focus from product development to customer service [24]. The automotive sector is just now starting to investigate all of these technologies' potential uses.

CONCLUSION

It is evident that marketing intelligence services, mainly utilizing Machine Learning, have a serious impact on strategic planning regarding sales promotions within the automotive industry. This paper investigates how machine learning is being integrated with marketing efforts in the industry, especially in its ability to shift traditional approaches to new, more innovative, and results-oriented ones. This study found that machine learning significantly enhanced the capability of marketing intelligence systems to analyze vast datasets and to realize meaningful insights in making better marketing decisions. With this capacity, automotive companies can not only predict future trends but can also understand current consumer behavior. By better anticipating changes in the market, companies can also change their strategy quickly enough to maintain an advantage over the competition. A more personalized marketing approach can also be realized through ML-driven marketing intelligence systems, as demonstrated in the review. These systems look at what customers like and need and then send those ads and stuff that are more relevant to them. When things get personalized for customers, they’re happier, more involved, and more likely to buy and stick around. Yeah, but there are some problems with using ML for marketing stuff. There are a bunch of challenges to deal with, like how advanced the technology needs to be, how much money is needed to set up the data stuff, and how to keep the data safe and private. If ML in marketing is used to its full potential, you need to deal with these problems. The paper says that cars will use smart technology more and more in the future, and that will help them sell better. These techs will make market intel systems better at what they do.

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