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# Journal of Public Relations Research Middle East

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# Prediction of Consumer-Oriented Sales Promotion Technique Using Artificial Intelligence(*)

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# Prediction of Consumer-Oriented Sales Promotion Technique Using Artificial Intelligence

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## Abstract

Artificial Intelligence (AI) has been integrated into various practices, among which is the field of marketing. It allows marketers to analyze enormous quantities of customer data to predict their needs and wants and gain better consumers insights in order to enhance the overall customer experience. AI tools such as Dig Data or machine learning have proven to be very useful for segmenting, interpreting and predicting information about the company's target audience. Within the framework of Thaler's Transactions Utility Theory, and the concept of value consciousness, this study aims at offering a system to predict the customer's preferred sales promotion technique using machine learning algorithms of Artificial Neural Network and Decision Tree. The dataset is composed of responses of 298 promotion sensitive participants collected through online survey.

**Keywords**: Sales Promotions, Artificial Intelligence, Supervised Machine Learning, Transaction Utility Theory, Value Consciousness.

## Introduction:

When Artificial Intelligence is mentioned, the first things that come to mind are self-driving cars, robots, and scenes from the many science fiction films in the cinema market. In reality, Artificial Intelligence (AI) is the core of everything we use every day: *Google, Facebook*, *Netflix,* and *Amazon.* In the field of question-and-answer systems, the IBM Artificial Intelligence (AI) Watson platform was created, which is able to answer questions expressed in natural language. It can create music, converse, joke around, and even respond to inquiries. AI of Google is able to read more accurately than an expert one and is capable of mastering gaming in minutes. MIT AI is able to anticipate video motion two seconds in advance. Artificial Intelligence is the main guidance for Tesla as an innovative automatic car company; it can predict eventual collision with any object/animal and brake accordingly. We are so bombarded with newspaper headlines that threaten the disappearance of so many professions,

which show only examples of how Artificial Intelligence beats the best chessboards in the world (Manzia, 2018).

For many marketers, experiential anxiety and fear have given way to hope and enthusiasm for a new tomorrow, as the possibilities of Artificial Intelligence are endless as it can save marketers a lot of time and bring companies closer to consumers by gradually "capturing" them, reducing efforts on both the producer and consumer side.

Organizations are compelled to use strategies, procedures, and technologies which offer them a significant edge over their rivals in the rapid-fire, globally connected corporate world of today. Thanks to its many applications, Artificial Intelligence (AI) is considered revolutionary and disruptive as it enables the modeling of natural cognitive ability, that substitutes individuals in complicated processes (Yang, 2020). Natural language processing, image recognition, and object manipulation are among the subjects of ongoing research. AI tools come in a variety of forms, such as logical, human-inspired, and humanized tools (Kaplan & Haenlein, 2019).

With these starting premises, the objective of this study is to explore the way by which Artificial Intelligence tools help to better understand the purchase process and the most appealing consumer-oriented sales promotions technique that affect the purchase decision with regard to the transaction utility theory, value consciousness, and socio-demographic factors.

**Understanding AI:**

Among the proposed definitions, AI has been referred to automated machines generate more complex autonomous learning to simulate the intelligence of humans in activities like organizing, resolving issues, and learning (De Bruyn et al., 2020). Alternatively, as proposed by Kaplan and Haenlein (2019), Artificial Intelligence (AI) is the capacity of a system to accurately understand external input, learn from it, and apply this learning to the accomplishment of objectives and tasks via adaptable change.

AI is completely changing brands, marketing, advertising and perhaps the world as a whole. The impact on global markets is so important that many giant corporates are investing in automation that speeds up processes and makes them faster than others, allowing them to arrive first when consumers need them. Whenever the marketing and sales functions do not automate their processes, there is a loss of competitive advantage; in fact, today CRM, sequential emails, scheduling posts on social media at the best times and other tasks that require a waste of time and resources if done manually, are fundamental (Kumar, 2021). Therefore, AI is a tool of growing importance in the marketing function. Marketing is a "consumer" rather than a "producer" of Artificial Intelligence (Kozinets, & Gretzel, 2021).

From a business point of view, the main utility of AI is to use it to study and predict consumer purchasing decisions. Tools such as Big Data or machine learning have proven to be very useful for segmenting, interpreting and predicting information about the company's target audience (Dimitrieska et al. 2018).

## Machine Learning Methods:

According to Feng et al. (2021), AI is built on the idea that "Computers have the ability to learn from experience;" Machine learning (ML) is the term for this skill. This branch of Artificial Intelligence, according to Dimitrieska et al. (2018), enables programs to process enormous amounts of data to develop predictable algorithms that get better over time. For this reason, as stated by Sterne (2017), it can be said that machine learning is a computer posing as a program that analyzes data, but Artificial Intelligence (AI) is a machine posing as a person.

According to Sterne (2018), Machine learning has three categories: supervised learning; unsupervised learning; and reinforcement learning.

1. Supervised Learning:

A Supervised learning algorithm is used when the needed results to be achieved from a problem is quite clear, but the relationship among these results is ambiguous which affects the output. Therefore, in order to achieve the desired output, machine learning algorithm is applied on the data so as to understand the relationships among elements of different data (Chinnamgari, 2019). The majority of the ML algorithms construct models for prediction in which some input is given results in output featured in discrete metrics for tasks involving classification or values that are continuous for tasks involving regression (Morales & Escalante, 2022). To sum up, the supervised machine learning algorithms are used when the goal is well-defined, and the input data is available for training the algorithms to learn the form of pattern. Several supervised algorithms exist. Such as: Classification and Regression Trees (CART); logistic regression; linear regression; Naïve Bayes; neural networks; k-nearest neighbors (KNN); support network machine (SVM); and Random Forests (RF) (Ippolito, Ferguson, & Jenson, 2021; Chinnamgari, 2019).

2. Unsupervised Learning:

The unsupervised learning deals with cases where there’s scarcity in labeled data, and it will be expensive to label the data manually (Chinnamgari, 2019). These algorithms' primary goal is to create groups based on the dataset where within the one group elements are alike under specific conditions, and different to the other groups elements under the same conditions (Morales & Escalante,

2022). Unsupervised machine learning techniques, known in statistics as methods of exploratory data analysis, establish automatically a dataset organization by which reliance on a-priori categorization or further imposed limits and assumptions is reduced. Mostly methods of unsupervised learning descent from the cluster analysis methods family, in which the clusters are inferred through measures of probabilistic, similarity, or Euclidian distance. The most common includes Self-Organizing Maps (SOM), Hierarchical Clustering, Gaussian Mixture Models, Hidden Markov Models, and K-Means Clustering (Ippolito, Ferguson, & Jenson, 2021).

3. Reinforcement Learning:

The reinforcement machine learning method is not either supervised or unsupervised learning. It is not categorized as supervised learning because no labeled data is provided for the algorithm for training. On the other hand, it is not considered unsupervised learning because the algorithms are provided with tips that enables the algorithms to take steps for solving the problem (Chinnamgari, 2019). This technique of machine learning uses interactions with the environment to learn how to act. Finding the best way to link states to actions (policy) in order to maximize the total anticipated return is the aim. Unlike other machine learning methods, this one evaluates the system while it is being learned (Morales & Escalante, 2022).

**Consumer-Oriented Sales Promotions:**

Sales promotions can be defined as a straight inducement having an ultimate goal of making a quick sale by giving the product's distributors, sales force, or end consumer extra value or an incentive (Belch &Belch, 2018). It is a temporary inducement of some kind to provide customers an additional incentive to purchase. Through sales promotions geared towards consumers, businesses are engaged with consumers with the goal of persuading them to make a purchase shortly after getting their products. This incentive, which may take the form of a coupon, price cut, chance to participate in a competition or sweepstakes, money-back refund or rebate, or an increased quantity of a product, is typically the focal point of a promotional program. Incentives can also take the form of free product samples offered in the hopes that they would lead to future purchases or premiums like the toys provided by McDonalds on purchasing a Happy Meal (Belch &Belch, 2018; Blattberg & Briesch, 2012). These sales promotions techniques can be categorized into monetary and non-monetary sales promotions. The monetary sales promotions provide the consumer with benefit of money saving. For example, price-off deals, refunds and rebates, and coupons are considered monetary sales promotions techniques. Conversely, non-monetary sales promotions offer buyers an advantage other than the financial incentives, such as contests, sweepstakes, samples, and loyalty programs (Sinha, & Verna, 2017). Buil, De Chernatony, & Montaner, (2013)

suggest that this kind of sales promotions are suitable with both commodities: hedonic and utilitarian, because they offer the customer an extra benefit that is not derived from the product itself.

**The Use of AI in Marketing:**

In the fields of marketing and advertising, data is now a commoditized good. It enables businesses to target specific campaigns that are more suited for each demographic segment by allowing them to precisely profile their clients. Using this data, businesses may be able to communicate with consumers in a way that alters or influences their opinions or even encourages consumption. A corporation can gather enormous amounts of data on consumer behavior using Big Data and AI technology, getting to know its customers better and tailoring products and services to anticipated needs (Cook García, 2022). There are primarily five uses for these technologies in the marketing industry:

1. Data-driven marketing may be summed up as the effective utilization of consumer information to better understand them and communicate with them. Basically, transforming information into knowledge and earning from knowledge. Data Driven Marketing addresses some of the fundamental needs we see in marketing, including: 1) a constant search to maximize return on investment, knowing better the responses to our impacts; 2) greater visibility on the result of potential decisions, thus being able to be more effective in investments; 3) alignment of business objectives with the real needs of the public; 4) expansion of the amount of data we can obtain from online channels; and 5) a shift towards a "customer-centric" approach (Sheth & Kellstadt, 2021).
2. Process automation: assisting in improving the amount and quality of communications with customers and prospects. Automated solutions, like CRMs, make it possible to manage marketing operations 360 degrees in respect to the customer connection. Among its many features, CRM keeps data on both existing and future clients, offers quick insights, and makes routine chores easier. The impact is increased by the constant customization of all these features for various jobs or clients (Chatterjee, Chaudhuri & Vrontis, 2022).
3. Content Creation: making your own content is now feasible thanks to Artificial Intelligence and Big Data technology. Company or organization blogs, creative music or art, frequently produced by systems or algorithms that appear to be crafted by humans but really take a fraction of the time. We may also call attention to the enhancements in content editing, translation, or duplicate detection, which contribute to the creation of newer, more original material (Kreutzer et al. 2020).
4. Social networks and textual analysis: Social networks have a significant impact on how customers view brands nowadays, making their presence

there crucial for organizations (Valencia Garca, 2021). Social networks' millions of interactions generate enormous volumes of data that are used as fuel for Big Data and Artificial Intelligence approaches. An organization may entirely manage the subjects that appear in its networks using automated learning algorithms. It can also categorize and analyze trends and issues that concern its consumers and rivals (Capatina et al. 2020).

5. Programmatic Advertising: This innovative method of buying and selling in the digital advertising business operates entirely automatically. This automation makes it possible to buy large audiences, analyzes population groups using Big Data, and develops advertising strategies depending on the requirements of each customer (Chen, Xie, Dong, & Wang, 2019)). Several components make up the process, including the "Demand Side Platform" (DSP) and the "Sell Side Platform" (SSP). DSPs are platforms where marketers, agencies, and businesses may efficiently and automatically obtain data, reducing human analysis mistakes. The platforms where the advertising spaces where marketers would be able to display their adverts are sold are known as SSPs (or "Sell Side Platforms"). The data from the DSP and SSP are combined in accordance with the requirements of the advertiser, and the ideal location for the ad is then offered through the Ad Exchange. The Microsoft Advertising Exchange, OpenX, and DoubleClick are a few examples of ad exchanges (Liu, Zhang, & Li, 2018).

## Literature Review:

Devrang, Chintan, Gunjan, and Krupa (2019) marked the importance of AI in marketing through means of secondary and primary research. They provided examples for companies in India that employed AI in the marketing process and tried to show the acceptability of those sectors for AI in marketing. The researchers found that AI helps companies to have a better understanding of their customers and personalize goods and services that fit their preferences. On a customer service level, the study showed that automated customer service applications gain a favorable attitude from the customers end and the companies end for its capability of minimizing costs. The researchers have reached out that AI have an enormous capability to solve many problems (Devrang et. al. 2019). In another study conducted in Romania, researchers aimed at identifying the practical benefits and associated risks of implementing specific analytical framework for incorporating Artificial Intelligence (AI) technologies into retailing organizations' information technology platforms by conducting a thorough analysis of the latest research to investigate the issue of AI implementations in depth. The goal is to use Artificial Intelligence (AI) techniques in retailing and to capitalize on the findings. The study found a wide range of cutting-edge solutions, advantages, and threats that Artificial

Intelligence (AI) brings to the retailing sector in various value chain segments. These are denoted by the acronyms CECoR, which stand for enhanced Customer Experience (CE) owing to virtual agents (chatbots, virtual assistants, etc.), cost reductions (Cost, Co.) attained by using smart shelves, and increased revenue (Revenue, R) resulting from suggested products, promotions, and tailored price reductions. The suggested conceptual framework is based on the consumer profile and offers suggestions for using AI in a retail setting from the standpoint of CECoR aspects (Anica-Popa, Anica-Popa, & Rădulescu, 2021). The use of AI for the purpose of better understanding of purchasing and consumption behavior was also determined by Purcărea, Ioan-Franc, Ionescu, and Purcărea (2021). Based on a comprehensive review of the scientific literature on the impact of Artificial Intelligence in retail, to illustrate the dynamics of the relationship involving this effect and customer perceptions of Artificial Intelligence, the authors have employed quantitative data. Data was gathered via a survey in a Romanian supermarket chain. In the context of the convergence of connect-disconnect, which is validated by the store of the future and customers' use of mobile phones in their omnichannel shopping journey, consumer perceptions of Artificial Intelligence were deemed to be key indicators of the successful use of AI-mediated interactions. Retailers may learn a lot from the study about how Romanian consumers' consumption and purchasing habits are evolving as the country moves toward the new normal (Purcărea, Ioan-Franc, Ionescu, & Purcărea, 2021). The supervised learning algorithms of Random Forests (RF) and linear regression was used by Javed Awan, Mohd Rahim, Nobanee and Khalaf (2021) in their study to predict future sales and pricing using Black Friday datasets. Through the use of Big Data framework, the study intended to help personalization of promotions and deals by retail companies for their customers. The Big Data framework enables the researchers to deal with huge sales volumes efficiently even during the COVID-19 pandemic. The researchers obtained the datasets of Black Friday sales data from Kaggle website. Approximately 550,000 observations total from 10 characteristics were evaluated both statistically and subjectively in the dataset. Sales and purchases were classified by class label. Since the predictor label is continuous, regression models are the most appropriate in this situation. Using the Apache Spark Big Data framework and the machine learning library MLIB, the researchers employed two machine learning models: Random Forest and linear regression. When the Spark framework was not used in the initial implementation of the linear regression and random forest models, accuracies of 68% and 74% were attained, respectively. The models were then trained using Spark machine learning's large data framework. For the linear regression model, the attained accuracies were 72%, and for the random forest model, they were 81% (Javed Awan et al., 2021). Another study that employed the supervised learning algorithms by Kőrösi and Vinkó (2021). The researchers used combinedly different models of classification and regression, including XGBoost, GBM,

Random Forest, and Logistic regression to offer a proposed system that can make an offer of sales promotions or user-level marketing letter. Based on the history of purchases and profile information of consumers, the study aimed to forecast the form of sales promotion and ads group most likely to be used by users. A robust hybrid model has been designed by the researchers to forecast form of interested sales according to the behavior of user in large e-commerce website with accuracy of 79%. This limited accuracy was due to the difficulty of making an accurate model of prediction from few purchases and short (Kőrösi & Vinkó, 2021). Similarly, Martínez, Schmuck, Pereverzyev Jr, Pirker, and Haltmeier (2020), conducted a study that focused on the retail industry. The study used data from a large retail company to train and test their machine learning models. The authors used various feature engineering techniques to extract relevant information from the customer purchase data, such as time-related features, customer behavior features, and product features. The authors then compared several machine learning algorithms, including logistic regression, random forest, and gradient boosting, to predict whether a customer will make a purchase in the future. The results showed that the machine learning framework developed by the authors was able to predict customer purchases with a high level of accuracy 86.68%, outperforming traditional statistical models (Martínez, et al., 2020).

These studies offer insightful information about the various ways AI is being applied in marketing, particularly in terms of improving customer experience, cutting expenses, raising income, and forecasting consumer behavior. The literature review provides a strong framework for comprehending the possible advantages and difficulties of integrating AI into consumer-oriented sales marketing strategies as researchers investigate these possibilities.

**Problem Statement:**

Though Artificial Intelligence (AI) is becoming more widely acknowledged as a game-changing technology in marketing, little is known about how AI can identify and enhance consumer-focused sales promotion strategies. There is a lack of particular study tackling the determination and customization of sales promotions based on individual consumer preferences, despite the fact that the existing literature offers insights into the benefits of AI in customer comprehension, personalization, and predictive analytics.

**Importance of the Study:**

This work is significant because it has the potential to convert marketing strategies by using AI to identify and customize sales promotion strategies to the interests of specific customers. The findings of this study may have a significant impact on customers, companies, and the world of academia at large.

They may also open the door to more individualized and successful marketing tactics in the digital age.

**Study Objectives:**

By examining the effectiveness of AI in identifying and customizing sales promotion technique to correspond with the unique preferences of customers, this research seeks to:

1. Examine how well AI models work to customize offers and promotions for clients.
2. Analyze how much AI helps with better understanding and personalizing marketing efforts for customers, especially when it comes to adjusting sales promotions based on individual preferences.
3. Contribute to the knowledge base of the application of AI in marketing practices.
4. Give companies advice on how AI may help them adjust to shifting customer behavior.

**Research Hypotheses:**

RH1: AI-based Artificial Neural Network Algorithm will effectively predict the customer's preferred type of sales promotions.

RH2: AI-based decision tree algorithm will effectively predict the customer's preferred type of sales promotions.

**Theoretical Framework:**

**Transaction Utility Theory:**

The notion of transaction utility was first presented by Thaler (1985), who contended that the entire benefit gained from a buying process is influenced by both acquisition utility and transaction utility. Acquisition utility is the anticipated benefit of owning the product (i.e., its features) compared to the cost of doing so (i.e., the product's price). Conversely, the discrepancy between the internal reference price and purchase price of the product was represented as transaction utility. The psychological gratification that arises from striking a good deal or bargain is what gave rise to it. Given that they spent less for the goods than it would have otherwise cost, it was assumed that they were happy. McNeill, Fam, & Chung (2014) acknowledged the relationship between the acquisition utility and transaction utility, and sales promotions; this implies that consumer satisfaction in general is significant (as it can affect perceived acquisition utility), but that consumer satisfaction with the sales promotion as a whole is also important (as it affects transaction utility) and should be taken into account when determining the likelihood of repeat behavior or taking advantage

of future sales promotion offers. Furthermore, higher-priced things may be able to achieve higher degrees of pleasure and satisfaction with the special bargain than lower-value commodity purchases, according to transaction utility theory (McNeill, Fam, & Chung, 2014).

## Value Consciousness:

What is received, paid for, or scarified affects the consumer's overall assessment of a product's utility. The connection between the price and the quality obtained is known as value consciousness. Value consciousness is "a concern for paying low prices, subject to some quality constraints," according to Lichtenstein, Netemeyer, and Burton (1990). Higher value-conscious consumers usually care about both affordable prices and high-quality products equally. In order to get the greatest bargain, people are also more likely to research pricing and compare costs across brands (Sharma, 2011). On the other hand, Customers that are less aware of values are less driven to get the best deal given the quality of the goods. Value consciousness is found in prior research to adversely limit the positive link between behaviors of repurchase and loyalty intentions (Zheng et al., 2017).

The theory of Transaction Utility by Thaler (1985) and the concept of Value consciousness by Lichtenstein, Netemeyer and Burton (1990) has been used as a theoretical framework for the study upon which the survey questions have been formulated. The variable of the mentioned theoretical framework will be used as determinant factors of the consumer preference of the type of sales promotions.
By examining elements like acquisition utility (expected advantages of the offer) and the psychological impact of getting a good bargain (transaction utility), Artificial Intelligence (AI) may significantly contribute to the assessment and prediction of customers' views of transaction utility. The transaction utility framework is in line with AI's capacity to evaluate and comprehend customer reactions to promotions by taking into account both the attributes and the perceived cost.

AI is able to forecast and customize sales campaigns that appeal to this particular customer category by comprehending the relationship between the price and the quality acquired (value consciousness). Furthermore, the AI model's prediction of the long-term effects of sales promotions can be informed by study results about the ways in which value consciousness drives repurchase behaviors and loyalty intentions.

## Research Methodology:

The paper employs a quantitative research design in which an online survey is distributed through different social media platforms such as Facebook and WhatsApp, and survey distribution websites such as surveycircle.com, and surveyswap.io.

The sample of the study is a non-probability purposive sample as the participants are chosen based on specific qualifications that they possess. The selected participants are those who are promotion sensitive whose purchases are generally based on promotions. A filtration question was included in the research instrument to exclude participants who are not considered promotion sensitive. The total number of respondents is 306, eight of which are excluded because they do not consider sales promotions in their purchase decisions and have no preferences for the type of sales promotions. Hence, 298 responses undergo the data analysis. 63.1% of the respondents are females and 36.9% are males aged from 18 and above.

**Research Instrument:**

The researchers used a questionnaire as a measurement instrument to examine the effect of different independent variables on consumers' preference of the sales promotion techniques. The underlying concepts of the transaction utility theory and the value consciousness were used for formulating the questions. The questionnaire consisted of four sections: the first section asks the respondents to determine the most preferred type of sales promotions (monetary, or non-monetary) and the possible reasons behind their preference. Section two comprises of statements to collect the perceptions of the respondents on the research framework constructs. Section three gathers the sociodemographic characteristics of the respondents including: age, gender, income, education, employment status, and frequency of purchasing FMCG (fast-moving consuming goods).

The independent variables constructing the research framework composed of acquisition utility and transaction utility of Thaler's Transaction Utility Theory (1985). A third independent variable of value consciousness was added based on Lichtenstein, Netemeyer and Burton (1990) research entitled "Distinguishing coupon proneness from value consciousness." The two variables of acquisition utility and transaction utility were measured using statements adopted from Al-Sabbahy, Ekinci, and Riley (2004), Lichtenstein, Netemeyer and Burton (1990), Grewal, Monroe, and Krishnan (1998), and Yuan, Liu, and Blut (2022), whereas value consciousness statements were adopted from Lichtenstein, Netemeyer and Burton (1990), and Yuan, Liu, and Blut (2022). The statements were extended and refined according to pilot checks. The modifications of statements included rewording and expansion to fit the sales promotions preference attributes. Every assertion was evaluated using a five-point Likert scale in which 1 is strongly disagree, and 5 is strongly agree.

The questionnaire was examined by a number of academic professors of advertising and computer science to verify its external validity. A pilot study

was done on 5% of the sample to test the internal validity of the research tool, and accordingly the questionnaire was modified.

*Table 1: Study Variables and Attributes Featuring the AI Algorithms Input*

| **Variables and Attributes** |
|---|
| Acquisition Utility |
| *Feeling of getting money's worth* |
| *Getting good value of spent money* |
| *Type of sales promotion provides excellent value for the money* |
| *Type of sales promotions is worthwhile buying because it helps using the product at reasonable price* |
| Transaction Utility |
| *Type of sales promotions is a good deal and attractive offer* |
| *The pleasure for getting a good deal on price, or something extra on the purchase* |
| *Post purchase satisfaction* |
| Value consciousness |
| *Concern about price vs. quality* |
| *Comparing different brands for getting the best value for money* |
| *Maximizing the quality for spent money* |
| *Comparing price information* |
| *Likability of brand switching according to type of sales promotions* |
| Sociodemographic Factors |
| *Age* |
| *Gender* |
| *Educational level* |
| *Annual household income* |
| *Marital Status* |
| *Number of household members* |
| *Employment status* |
| *Region of residency* |

## Data Analysis:

The responses of 298 participants are analyzed to test and answer the research hypotheses and questions using the following techniques:

1. Parametric statistics (Pearson r correlation):

The researchers used the parametric statistics technique of Pearson ŕ Correlation to detect the relationships between the preferred type of sales promotions and the independent variables of acquisition utility, transaction utility, value consciousness, and sociodemographic factors. This is done as an initial step before starting the machine learning process to ensure that more accurate results can be obtained.

2. Supervised Machine Learning Algorithms:

The collected dataset has been analyzed through supervised machine learning techniques to offer a proposed system to select the best consumer-oriented sales promotion technique in accordance with the Transaction Utility Theory, the concept of value consciousness, and sociodemographic factors.:

a. Preprocessing Step:
   - Feature Selection:
     i. Generate Neural Network Architecture

Neural Network Architecture specifies how each of its many neurons is positioned in respect to the others. These configurations are primarily constructed by controlling the neurons' synaptic connections. (Da Silva, Hernane Spatti, Andrade Flauzino, Liboni, & dos Reis Alves, 2017).

Conversely, training an architecture entails performing a series of ordinated actions to modify the neuronal thresholds and weights. Thus, the goal of this adjustment process—also referred to as a learning algorithm—is to fine-tune the network to the point where its outputs are almost in line with the intended values (Da Silva, et. al. 2017).

Generally speaking, there are three layers in an artificial neural network. These layers are referred to as:

(a) *Input layer*

Receiving external information, notifications, traits, or measurements is the responsibility of this layer. Typically, these inputs—samples or patterns—are scaled along with the range of values that activation functions generate. Better numerical precision is the outcome of this normalization regarding the computations that the network performs (Da Silva, et. al. 2017).

(b) *Hidden, intermediate, or invisible layers*

These layers' neurons are in the midst of spotting patterns related to the framework or function that is being studied. These layers undertake nearly all of the internal tasks of a network (Da Silva, et. al. 2017).

(c) *Output layer*

Since neurons make up this layer as well, It is responsible for producing and presenting the network's final outputs, which are the result of the neurons' processing. in the layers above (Da Silva, et. al. 2017).

ii. Decision Tree (Random Forest)

Leo Breiman of the University of California initially proposed the random forest in 2001 (Breiman, 2001). It consists of many basic classifiers (decision tree) that are totally unrelated to one another. Provide a trial piece for the novel classifier, and it will determine the sample's class label based on the votes received for each individual classification (Parmar, Katariya, & Patel, 2019).

b. The Confusion Matrix:

It displays the algorithm's forecast in comparison to the actual numbers (Valero-Carreras, Alcaraz, & Landete, 2023). It is represented by a matrix that describes the performance of a classification model on a collection of test data (Gupta, Kose, Khanna, & Balas, 2022).

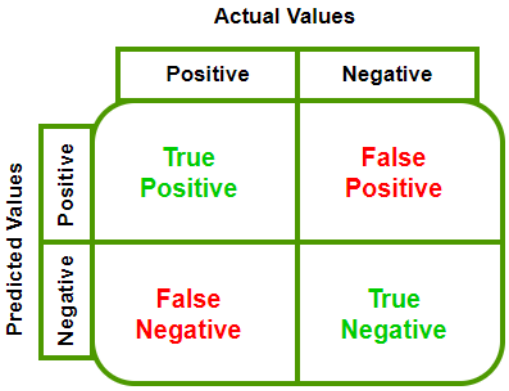


*Figure 1: Confusion Matrix*
*Source: https://www.geeksforgeeks.org/visualize-confusion-matrix-using-caret-package-in-r/*

The counts of the actual and predicted values are displayed in confusion matrices. The result labeled "True Negative," or "TN," shows how many negative situations were accurately classified. In a similar spirit, "TP" stands for True Positive and denotes the percentage of positive instances that are accurately detected. False Positive (FP) stands for False Positive instances, or the number of actual negative cases identified as positive, while False Negative (FN) stands for the number of true positive examples classified as negative (Kulkarni, Chong, & Batarseh, 2020).

Classifier Evaluation Criteria:

1. The Positive Predictive Value (PPV) or Precision: quantifies the positive patterns that are correctly predicted from all projected patterns in a positive class (Hossin & Sulaiman, 2015).
   $PPV = TP / (TP + FP)$

2. Recall: measures the proportion of positive patterns that can be accurately classified (Hossin & Sulaiman, 2015).

$$Recall = \frac{TP}{TP+TN}$$

3. Accuracy: calculates the proportion of accurate forecasts to all cases examined (Hossin & Sulaiman, 2015).

$$Accuracy = \frac{(TP+TN)}{(P+N)}$$

4. Sensitivity: The proportion of positive patterns that are accurately classified (Hossin & Sulaiman, 2015).

$$Sensitivity = \frac{TP}{(TP+FN)}$$

5. Specificity: The percentage of patterns that are negative that are successfully classified (Hossin & Sulaiman, 2015).

$$Specificity = \frac{TN}{TN+FP}$$

6. F1-Score: calculates the classifier's accuracy and recall by taking its harmonic mean to consolidate them into a single metric (Valero-Carreras, Alcaraz, & Landete, 2023).

$$\text{F1-Score} = 2\times \frac{Precision \times Recall}{Precision+Recall}$$

## Results:

The researchers analyzed 298 responses using Pearson r correlation and supervised machine learning algorithms. It was essential for the researchers to initiate the data analysis with testing the existence of correlation between the independent variables (acquisition utility, transaction utility, value consciousness, and demographic factors) and the type of sales promotions preferred by the consumers (monetary, non-monetary, or both) to offer a system of prediction with high accuracy. The results of the Pearson r correlation have showed high significant correlation between the level of acquisition utility and transaction utility and the preferred type of sales promotions (0.000) at $p \leq 0.01$. The value consciousness has not showed significant correlation with the preferred type of sales promotions (0.65) at $p \leq 0.05$, but it has been kept in the dataset to check the minimal effect it would produce. The demographic factors have shown significance with some factors like gender (0.008), annual income (0.000), and place of residency (0.002) at $p \leq 0.01$, while have not shown significant with other factors like age, education, and marital status. These results support the findings of (McNeill, Fam, & Chung, 2014) who asserted that customer satisfaction in general is affected by acquisition utility and the satisfaction with sales promotions is affected by the transaction utility; nevertheless, in high involvement products, the post purchase satisfaction and pleasure with sales promotions is affected by both the acquisition and transaction utility.

It can be inferred that the relevance of perceived advantages vs costs in customer decision-making is emphasized by transaction utility theory. Sales promotions, like discounts or special offers, change how much a product is perceived to cost by offering extra benefits (such discounts or freebies). Sales promotions improve the transaction utility for customers by reducing the perceived cost of acquisition, which increases the chance of conversion and makes the purchase more enticing. In addition, the possibility of getting a commodity at a reduced cost might make one feel happy and content.

## AI Results:

The dataset was divided into two groups: 20% for testing, and 80% for training. After training the Artificial Neural Network (ANN) and Decision Tree (DT) algorithms, the following results were obtained:

## Artificial Neural Network (ANN):

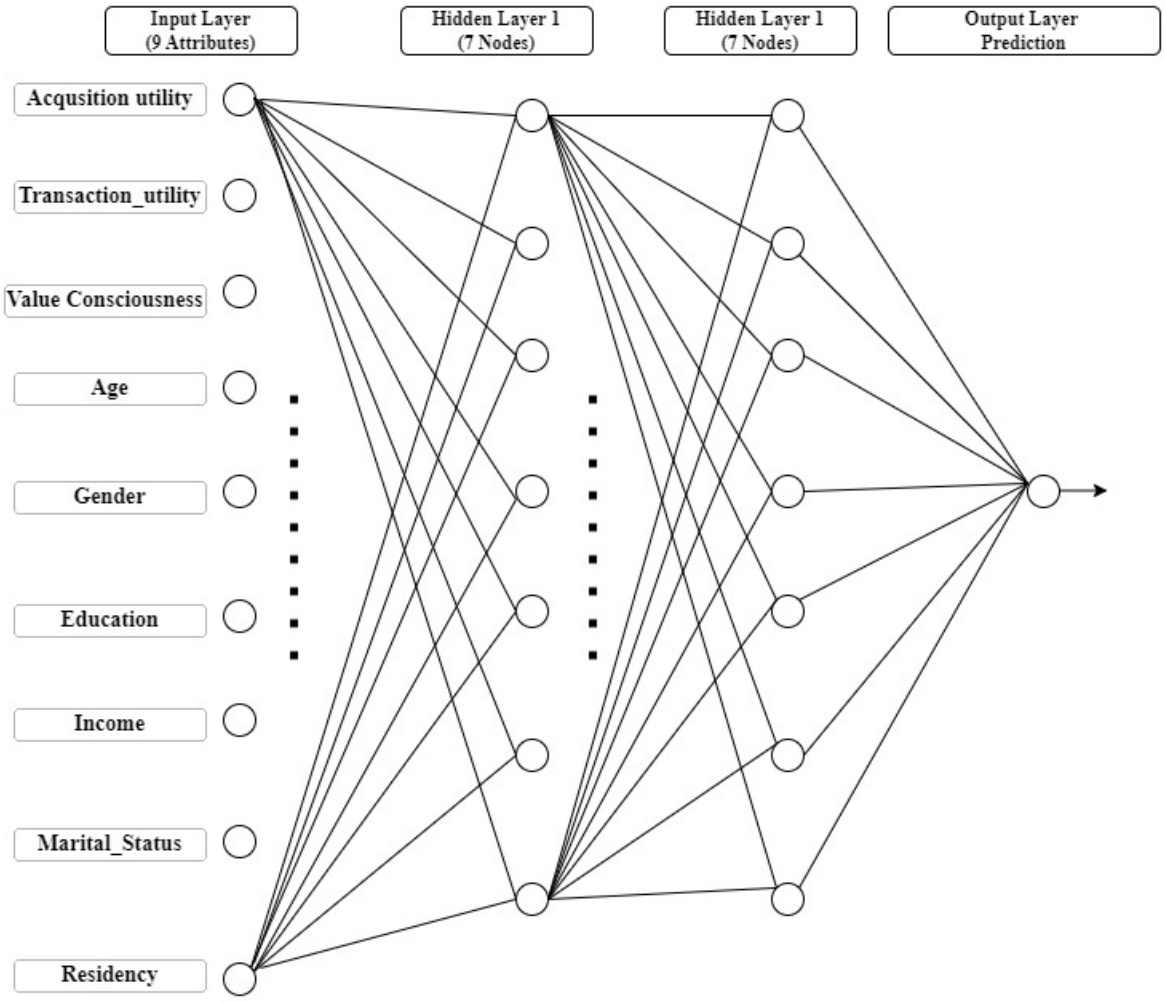


*Figure 2: Structure of Proposed Neural Network*

One of the Artificial Neural Network (ANN) feedforward models is the multilayer perceptron which converts the dataset input to a group of meaningful output. The layers consist of input, output, and hidden layers, where the input layer gets the signal of processing, and the output layer executes the essential tasks of prediction and classification. Whereas the hidden layers are the true engine of processing of the multilayer perceptron that consist of infinite layers sum amid (input / output layers). Data goes through the output layer to the output layer in a frontward mode in the feedforward neural network the same way as in multilayer perceptron (Abd Ali, Chalob, & Khudhair, 2022).

The Artificial Neural Network comprises nodes, with a hidden optional layer, an output layer denoted by $\mathbf{y}$, and an input layer represented by $x_1$, $x_2$,.. $x_n$. Finding weights among (input / output/ hidden layers) which minimalize the total squared errors is the aim of the Artificial Neural Network. During training, these $w_i$ weights are adjusted according on $\gamma$, a learning parameter that falls

between [0, 1, and 2] until the outcomes are consistent with one another (Abd Ali et. al, 2022). Monetary, non-monetary, or both are the three occurrence classifications in the current investigation.

The Artificial Neural Network comprises nodes and layers series per every one of these layers. To test RH1: "AI-based Artificial Neural Network algorithm will effectively predict the customer's preferred type of sales promotions," the researchers trained several types of multilayer neural network, and the best structure gives the best results shown in figure 2. The figure consists of four layers; the first layer is the one that consists of the input attributes which include the attributes of acquisition utility, transaction utility, value consciousness, and the sociodemographic factors. The second layer (1st Hidden layers) holds seven nodes. The third layer (2nd Hidden layers) holds seven nodes. The final layer presents the layer of the output holding one node which generate the predicted output (monetary or non-monetary or both).

**Decision Tree (DT):**

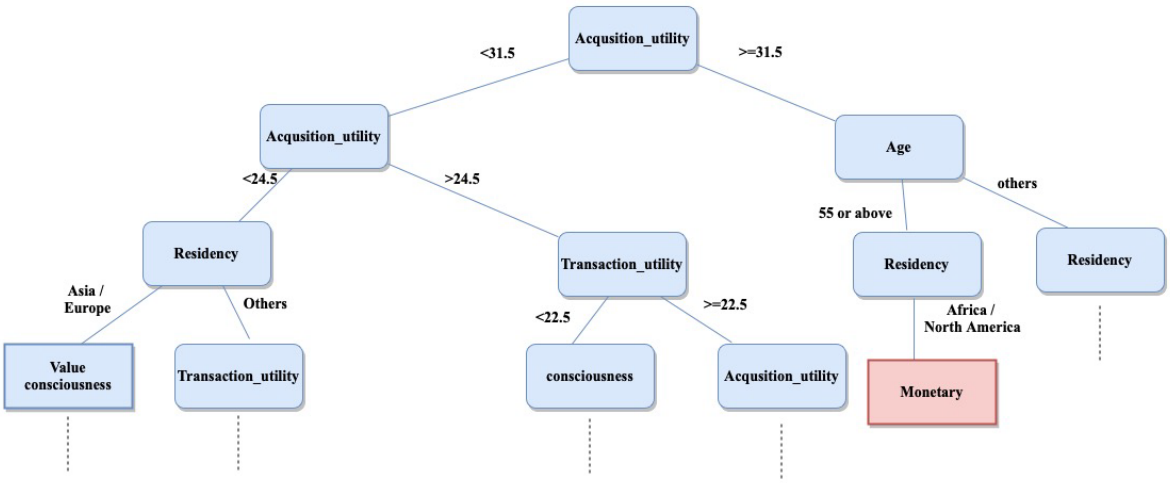


*Figure 3: Obtained Decision Tree*

Preparing a set of solved cases is what comes in the beginning when using decision trees for getting an answer. The entire set then splits in dual clusters. The first is to train a set used to generate a decision tree. The second is a set for testing used to evaluate the produced response accurateness. Before choosing a feature to serve as an option for the given task, the characteristics defining individual situation become first provided (input / output data). There are unique value classes defined for every input attribute. When the feature consents only a single value among these discrete ones, then each discrete value is categorized under its particular category; while when a feature consents a range from numerical values, then many classes must be represented by a set of characteristic intervals (Muaad, et. al. 2022). Figure 3 shows part of the obtained decision tree. To test RH2: "AI-based decision tree algorithm will effectively predict the customer's preferred type of sales promotions," the

researcher generated a decision tree which takes the variables and produces the best variable that used to split the data according to the three classes (monetary, non-monetary, and both). As shown in the figure the best variable is acquisition utility at a degree of 31.5. The decision tree selects the best second attribute and repeat the selection until completing the tree. It is shown that in "monetary" class obtained when acquisition utility is >31.5, age is 55 or above, and residency is in Africa or North America. All classes obtained from the decision tree steps in the same manner.

"Acquisition Utility" is identified by the decision tree as the main decision node, demonstrating its important function in anticipating client desires. This is consistent with Transaction Utility Theory, which states that acquisition utility is the expected return on investment of a product relative to its purchase price. The 31.5 threshold represents the point at which the perceived benefit starts to offer a vital cut in identifying the kind of sales promotion that people prefer.

*Table 2: Neural Network and Decision Tree Performance*

| | *Accuracy* | *Precision* | *Recall* | *F1 Score* |
|---|---|---|---|---|
| *Neural Network* | 0.883 | 0.882 | 0.883 | 0.878 |
| *Decision Tree* | 0.869 | 0.879 | 0.869 | 0.864 |

Table 2 shows the performance of the two algorithms: The Neural Network, and Decision Tree. The Neural Network Algorithm obtained an accuracy of 0.883, 0.882 in precision, 0.883 in recall, and 0.878 in F1 score. As for the decision tree algorithm, 0.869 was obtained in accuracy, 0.879 in precision, 0.869 in recall, and 0.864 in F1 score.

*Table 3: Neural Network Confusion Matrix*

| | *Class 1* | *Class 2* | *Class 3* |
|---|---|---|---|
| *Class 1* | 29 | 1 | 2 |
| *Class 2* | 3 | 5 | 1 |
| *Class 3* | 0 | 0 | 19 |

Table 3 presents the results of the confusion matrix of Neural Network Algorithm. For Class 1 (Monetary) the algorithm was able to predict 29 cases correctly, while predict one as Class 2 (Non-monetary), and two cases were detected as Class 3 (Both). In Class 2 (Non-monetary), three cases were detected as Class 1 (Monetary), five cases were detected correctly as Class 2 (Non-monetary), and one was detected as Class 3 (Both). As for Class 3 (Both), none of the cases was detected wrongly, and 19 cases were detected correctly as Class 3 (Both). Therefore, RH1 is accepted.

*Table 4: Decision Tree Confusion Matrix*

| | *Class 1* | *Class 2* | *Class 3* |
|---|---|---|---|
| *Class 1* | 28 | 2 | 1 |
| *Class 2* | 3 | 7 | 2 |
| *Class 3* | 0 | 2 | 14 |

Table 4 presents the results of the confusion matrix of the decision tree algorithm. For Class 1 (Monetary) the algorithm was able to predict 28 cases correctly, while predict two as Class 2 (Non-monetary), and one cases were detected as Class 3 (Both). In Class 2 (Non-monetary), three cases were detected as Class 1 (Monetary), seven cases were detected correctly as Class 2 (Non-monetary), and two were detected as Class 3 (Both). As for Class 3 (Both), none of the cases was detected wrongly as Class 1 (Monetary), two were detected wrongly as Class 2 (Non-monetary), and 14 cases were detected correctly as Class 3 (Both).

The confusion matrices of Neural Network Algorithm and Decision Tree Algorithm show high accuracy of prediction within class 1 (monetary), and class 3 (both), but the number of correctly detected cases was low in class 2 (non-monetary) due to the limited number of samples in this class. Therefore, RH2 is accepted.

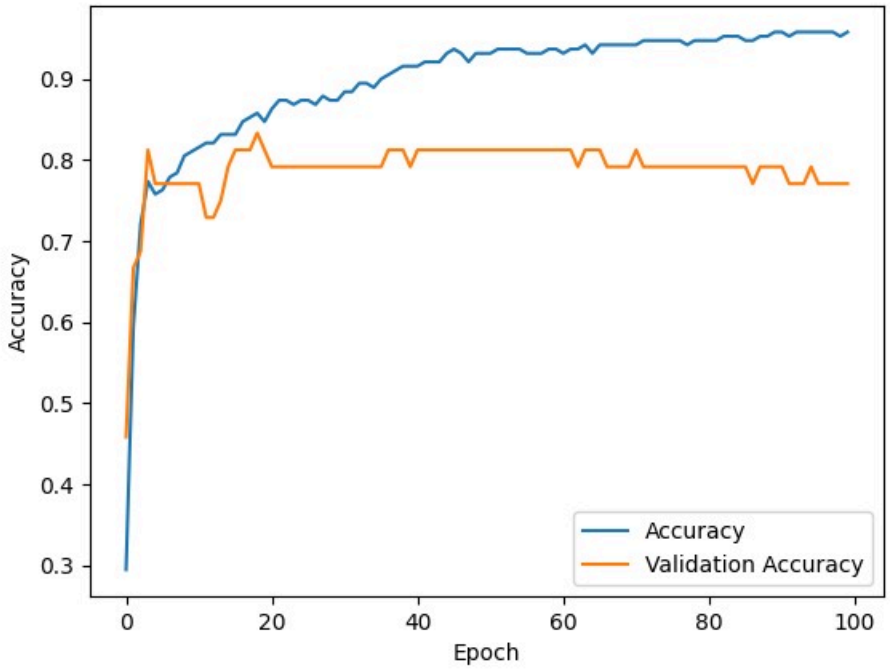


*Figure 4: Neural Network Accuracy for Validation of Dataset*

Figure 4 represents the Epoch versus the accuracy which is the number of iterations to reach the best accuracy. This graph shows the Epoch during the training phase. The training has been run until 100 Epochs, where it reached above 90% in the training phase, and around 80% in the testing phase.

The use of AI targets the prediction of customers' preferred sales promotions technique (monetary, non-monetary, or both). The proposed two models used to predict the preferred sales promotions technique with respect to the theory of transaction utility and the concept of value consciousness, and sociodemographic factors.

In Neural Network, the input will be new / unknown customer with the variables in Table 1, such as (the extent to which the customer feels getting his/her money's worth; getting good value for the money he/she would spend; the extent to which the type of sales promotions provide value for the money; thinking of the type of promotion as a really good deal and an attractive offer; the extent to which the customer has pleasure for getting a good deal on price, or something extra on the purchase; the level of satisfaction after getting the offer; price versus quality; comparing brands; brands switching; and the demographic factors), and the weights from the proposed neural network (4 layers). In the first layer (9 nodes), in second layer 7 nodes, in third layer 7 nodes, and one node in the output layer. The output from the Neural Network will be one of the three classes (monetary; non-monetary; or both), while the Decision Tree trains the data and generates a tree as shown in figure 3, and the new customer will follow the tree from the first variable till the end of the tree (the class).

**Discussion:**

This study aims at using AI to propose a system to predict the customer's preferred type of sales promotions. Within the theoretical framework of the transaction utility theory by Thaler (1985) and the concept of value consciousness by (Lichtenstein et. al, 1990), the researcher collected the required dataset via an online survey. The dataset composed of four variables (Acquisition Utility, Transaction Utility, Value Consciousness, and Sociodemographic Factors) with 20 features (see Table 1) characterizing 298 customers. The researchers used supervised machine learning algorithms including Artificial Neural Network, and Decision Tree to help predict the type of the preferred types of sales promotions using the identified features. The architecture of the Neural Network comprised of four layers with the input consists of the attributes of each variable presented in Table 1. Two hidden layers process this input and output single node to represent one of the three classes: monetary, non-monetary, or both. Simultaneously, a decision tree model was used to evaluate and understand the data. The dataset was trained to create the tree presented in Figure 3. The Decision Tree essentially represented the steps a marketer would take to decide on the customer sales promotions preference, beginning with the initial variable and moving through the branches to get a certain class that may be either non-monetary, monetary, or both. The results of the supervised machine learning algorithms have produced high

prediction accuracy of 88% in neural network, and 87% in decision tree unlike (Javed Awan et. al., 2021) who achieved accuracies were 68% for Random Forest, and 74% for linear regression for a dataset composed of previous customer purchases to predict future customer purchases and sales. Also (Kőrösi and Vinkó, 2021) whose study aimed at forecasting sales promotions type using historical purchase data have achieved lower level of accuracy 79% for XGBoost, GBM, Random Forest, and Logistic regression algorithms. The difference in accuracy is expected because (Kőrösi and Vinkó, 2021) based their prediction model on four purchases only for forecasting while in this study the dataset used by the researchers is derived from a sample of 298 respondents. Although Artificial Neural Network algorithm has produced better results than in the decision tree algorithm, both algorithms have reached significant accuracy in predicting the type of sales promotions according to the Acquisition Utility, Transaction Utility, Value Consciousness, and sociodemographic factors. Nevertheless, the non-monetary sales promotions technique was the one with the least accurate prediction, this can be due to the limited number of respondents preferring this type of sales promotions.

## Conclusion:

These results highlight the potential of AI-powered models to improve sales promotion forecast accuracy, providing businesses with useful information to efficiently customize their plans and satisfy customers. Future studies on AI may look into more factors and complex models to improve the precision and usefulness of prediction systems in the ever-changing fields of marketing and consumer behavior.

**References:**

Abd Ali, D. M., Chalob, D. F., & Khudhair, A. B. (2022). Networks Data Transfer Classification Based On Neural Networks. *Wasit Journal of Computer and Mathematics Science*, *1*(4), 207-225.

Anica-Popa, I., Anica-Popa, L., & Rădulescu, C. (2021) Integrarea Inteligenței Artificiale În Comerțul Cu Amănuntul: Beneficii, Provocări Și Un Cadru Conceptual Dedicat [The Integration of Artificial Intelligence in Retail: Benefits, Challenges and a Dedicated Conceptual Framework]. *Amfiteatru Economic*, *23*(56), 120-136.

Belch, G., &Belch, M. (2018). *Advertising & Promotion: An Integrated Marketing Communications Perspective*, 11th ed. New York: McGraw-Hill Education

Blattberg, R. C., & Briesch, R. A. (2012). Sales promotions. In *Oxford Handbook of Pricing Management*. DOI: 10.1093/oxfordhb/9780199543175.013.0024

Breiman, L. (2001). Random forests. *Machine learning*, *45*, 5-32.

Buil, I., De Chernatony, L., & Montaner, T. (2013). Factors influencing consumer evaluations of gift promotions. *European journal of marketing*, *47*(3/4), 574-595.

Capatina, A., Kachour, M., Lichy, J., Micu, A., Micu, A. E., & Codignola, F. (2020). Matching the future capabilities of an artificial intelligence-based software for social media marketing with potential users' expectations. *Technological Forecasting and Social Change*, *151*, 119794.

Chatterjee, S., Chaudhuri, R., & Vrontis, D. (2022). AI and digitalization in relationship management: Impact of adopting AI-embedded CRM system. *Journal of Business Research*, *150*, 437-450.

Chen, G., Xie, P., Dong, J., & Wang, T. (2019). Understanding programmatic creative: The role of AI. *Journal of Advertising*, *48*(4), 347-355.

Chinnamgari, S. K. (2019). *R Machine Learning Projects: Implement supervised, unsupervised, and reinforcement learning techniques using R 3.5*. Packt Publishing Ltd.

Cook García, C. (2022). Inteligencia Artificial y Big Data en el Marketing: Publicidad programática y el uso de datos personales [Artificial Intelligence and Big Data in Marketing: Programmatic advertising and the use of personal data]. BA Thesis. Catholic Institute of Business Administration and Management (ICADE). Universidad Pontificia Comillas. Retrieved from https://repositorio.comillas.edu/xmlui/bitstream/handle/11531/63245/TFG%20-%20Cook%20Garcia%2c%20Carlos.pdf?sequence=2&isAllowed=y

Da Silva, I.N., Hernane Spatti, D., Andrade Flauzino, R., Liboni, L.H.B., dos Reis Alves, S.F. (2017). Artificial Neural Network Architectures and Training Processes. In: Artificial Neural Networks . Springer, Cham. https://doi.org/10.1007/978-3-319-43162-8_2

De Bruyn, A., Viswanathan, V., Beh, Y. S., Brock, J. K. U., & von Wangenheim, F. (2020). Artificial intelligence and marketing: Pitfalls and opportunities. *Journal of Interactive Marketing*, *51*, 91-105.

Devang, V., Chintan, S., Gunjan, T., & Krupa, R. (2019). Applications of artificial intelligence in marketing. *Annals of Dunarea de Jos University of Galati. Fascicle I. Economics and Applied Informatics*, *25*(1), 28-36.

Dimitrieska, S., Stankovska, A., & Efremova, T. (2018). Artificial intelligence and marketing. *Entrepreneurship*, *6*(2), 298-304.

Feng, C. M., Park, A., Pitt, L., Kietzmann, J., & Northey, G. (2021). Artificial intelligence in marketing: A bibliographic perspective. *Australasian Marketing Journal*, *29*(3), 252-263.

Grewal, D., Monroe, K. B., & Krishnan, R. (1998). The effects of price-comparison advertising on buyers' perceptions of acquisition value, transaction value, and behavioral intentions. *Journal of marketing*, *62*(2), 46-59. https://doi.org/10.1177/002224299806200204

Gupta, D., Kose, U., Khanna, A., & Balas, V. E. (Eds.). (2022). *Deep Learning for Medical Applications with Unique Data*. Academic Press.

Hossin, M., & Sulaiman, M. N. (2015). A review on evaluation metrics for data classification evaluations. *International journal of data mining & knowledge management process*, *5*(2), 1.

Ippolito, M., Ferguson, J., & Jenson, F. (2021). Improving facies prediction by combining supervised and unsupervised learning methods. *Journal of Petroleum Science and Engineering*, *200*, 108300. https://doi.org/10.1016/j.petrol.2020.108300

Javed Awan, M., Mohd Rahim, M. S., Nobanee, H., Yasin, A., & Khalaf, O. I. (2021). A big data approach to black Friday sales. *Intelligent Automation & Soft Computing*, *27*(3), 785-797. https://ssrn.com/abstract=3827077

Jha-Dang, P. (2004). A Review Of Theoretical Perspectives Applied To Sales Promotion And A New Perspective Based On Mental Accounting Theory. *Research Papers in Economics.*

Kaplan, A. and Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons*, *62*(1), 15-25. 10.1016/j.bushor.2018.08.004.

Kőrösi, G., & Vinkó, T. (2021). A practical framework for real life webshop sales promotion targeting. *Informatica*, *45*(4), 625-632. https://doi.org/10.31449/inf.v45i4.3066

Kozinets, R. V., & Gretzel, U. (2021). Commentary: Artificial Intelligence: The Marketer's Dilemma. *Journal of Marketing*, *85*(1), 156-159.

Kreutzer, R. T., Sirrenberg, M., Kreutzer, R. T., & Sirrenberg, M. (2020). Fields of application of artificial intelligence—customer service, marketing and sales. In *Understanding Artificial Intelligence: Fundamentals, Use Cases and Methods for a Corporate AI Journey*, 105-154. Springer, Cham. https://doi.org/10.1007/978-3-030-25271-7_4

Kulkarni, A., Chong, D., & Batarseh, F. A. (2020). Foundations of data imbalance and solutions for a data democracy. In *Data democracy* (pp. 83-106). Academic Press.

Kumar, P. (2021). Role of Artificial Intelligence (AI) in Marketing. Retrieved on May 31, 2022, from https://www.researchgate.net/publication/354200837

Lichtenstein, D. R., Netemeyer, R. G., & Burton, S. (1990). Distinguishing coupon proneness from value consciousness: An acquisition-transaction utility theory perspective. *Journal of marketing*, *54*(3), 54-67. https://doi.org/10.1177/002224299005400305

Liu, K., Zhang, J., & Li, F. (2018). The Principle and Applications of Business Promotion of E-commerce Enterprises Based on Big Data. 4th International Conference on Innovative Development of E-commerce and Logistics (ICIDEL 2018). DOI: 10.23977/icidel.2018.043

Manzia, A. (2018). Marketing automation: una nuova frontiera per le aziende business-to-business [Marketing Automation: A New Frontier for Business-To-Business Companies]. BA Thesis. Universita' Degli Studi Di Padova.

Martínez, A., Schmuck, C., Pereverzyev Jr, S., Pirker, C., & Haltmeier, M. (2020). A machine learning framework for customer purchase prediction in the non-contractual setting. *European Journal of Operational Research*, *281*(3), 588-596. https://doi.org/10.1016/j.ejor.2018.04.034

McNeill, L. S., Fam, K. S., & Chung, K. (2014). Applying transaction utility theory to sales promotion–the impact of culture on consumer satisfaction. *The International Review of Retail, Distribution and Consumer Research*, *24*(2), 166-185.

Morales, E. F., & Escalante, H. J. (2022). A brief introduction to supervised, unsupervised, and reinforcement learning. In *Biosignal Processing and Classification Using Computational Learning and Intelligence* (pp. 111-129). Academic Press.

Muaad, A. Y., Jayappa Davanagere, H., Benifa, J. V., Alabrah, A., Naji Saif, M. A., Pushpa, D., Al-antari, M. A., & Alfakih, T. M. (2022). Artificial intelligence-based approach for misogyny and sarcasm detection from Arabic texts. *Computational Intelligence and Neuroscience*, 2022, 1–9. https://doi.org/10.1155/2022/7937667

Parmar, A., Katariya, R., & Patel, V. (2019). A review on random forest: An ensemble classifier. In *International conference on intelligent data communication technologies and internet of things (ICICI) 2018* (pp. 758-763). Springer International Publishing.

Purcărea, T., Ioan-Franc, V., Ionescu, S.A. and Purcărea, I.M. (2021). Natura Profundă A Legăturii Dintre Impactul Utilizării Inteligenţei Artificiale În Comerţul Cu Amănuntul Şi Percepţiile Consumatorilor Cu Privire La Inteligenţa Artificială Pe Calea Către Următorul NormaL [The Profound Nature of Linkage Between the Impact of the Use of Artificial Intelligence in Retail on Buying and Consumer Behavior and Consumers' Perceptions of Artificial Intelligence on the Path to the Next Normal]. *Amfiteatru Economic*, *23*(56), 9-32.

Retrieved on 15 July 2023 from https://core.ac.uk/display/6443657?utm_source=pdf&utm_medium=banner&utm_campaign=pdf-decoration-v1

Sharma, D.S. (2011). Determinants of equity share prices in India. *Journal of Arts, Science and Commerce, 2*(4), 51-60.

Sheth, J., & Kellstadt, C. H. (2021). Next frontiers of research in data driven marketing: Will techniques keep up with data tsunami?. *Journal of Business Research*, *125*, 780-784.

Sinha, S. K., & Verma, P. (2017). Consumer's response towards non-monetary and monetary sales Promotion: A review and future research directions. *Journal of Economic & Management Perspectives*, *11*(2), 500-507.

Sterne, J. (2017). *Artificial intelligence for marketing: practical applications*. Hoboken, New Jersey: John Wiley & Sons. https://doi.org/10.1002/9781119406341

Thaler, R. (1985). Mental accounting and consumer choice. *Marketing Science*, 4 (3), 199-215.

Valencia García, A. (2021). La Inteligencia Artificial y la empresa: dilemas éticos generados por su aplicación en un futuro automatizado [Artificial Intelligence and business: ethical dilemmas generated by its application in an automated future]. Facultad de Ciencias Economicas y Empresariales. Universidad Pontificia Comillas. Retrieved from https://repositorio.comillas.edu/xmlui/handle/11531/46576

Valero-Carreras, D., Alcaraz, J., & Landete, M. (2023). Comparing two SVM models through different metrics based on the confusion matrix. *Computers & Operations Research*, *152*, 106-131.

Yang, L.B. (2020). Application of artificial intelligence in electrical automation control, *Procedia Computer Science*, *166*, 292-295. 10.1016/j.procs. 2020.02.097

Yuan, R., Liu, M. J., & Blut, M. (2022). What's in it for you? Examining the roles of consumption values and Thaler's acquisition–transaction utility theory in Chinese consumers' green purchase intentions. *European Journal of Marketing*, *56*(4), 1065-1107. DOI 10.1108/EJM-08-2020-0609

Zheng, X., Lee, M. and Cheung, C. (2017). Examining e-loyalty towards online shopping platforms. *Internet Research*, *27*(3), 709-726.