A Novel Hybrid Model for sustainable marketing to the fragile nature places using Artificial Intelligence (AI) and Six Sigma Marketing (SSM) Methodology

Abstract— Tourism in Egypt is one of the methods of national income for the country. Since the Arab Spring revolutions in 2011, tourism has stopped in Egypt. Tourism has started back in recent years in Egypt; but not at the same level as before, due to the COVID-19 pandemic in early 2020. This research follows a multidisciplinary approach involving the deep interaction among two key disciplines. that interaction is considered as fundamental for proposing a novel hybrid model to a business ecosystem for sustainable natural ecotourism place. A novelty model is adopting a holistic perspective for a prototype proposed technology modeling (Artificial Intelligence "AI" and marketing process organization) for gaining competitive advantages to sustain its revenues. The research addresses the business ecosystem in its entirety, framing the complexity of the project from several points of view. This research is focusing on the model core. The core is based on the relation between AI algorithms and marketing process organizations to gain competitive advantages to sustain its revenues. The Model has based on the awareness of the specific social and governmental policies in Egypt and the Egyptian strategic plan 2030. The natural tourist places in Egypt are characterized by a very fragile, uncertain, and dynamic nature. The research involves issues of different nature related to the difficult collection and retrieval of numerical data, the lack of certain and up-to-date references and sources, as well as the ambiguity, financial, social, and productivity.

Index Terms— sustainable marketing, fragile nature places, Artificial Intelligence (AI), Six Sigma Marketing (SSM) Methodology, Genetic Algorithm (G.A) , Neural Network (N.N) , Fuzzy Logic.

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1. INTRODUCTION

The proposed model is presented to maintain the profits of the natural places in Egypt. Research is presented as a framework of the prototype plan initial model based on the marketing mix tools throughout integrating six sigma marketing (SSM). In addition, adapting the (DMAIC) to the 7Ps as basic dimensions of the marketing mix are reflected the customer needs, where continuous improvement is a key quality idea in Six Sigma methods.

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2. BACKGROUND

2.1. Six Sigma 6σ

Since the beginnings of the 80's, Motorola introduced a new concept to improve its products called Six Sigma. This concept is based on the continuous improvement process using the DMAIC method (define, measure, analyze, improve and control). After the success of the concept, many companies adopted to achieve their goals in production and in providing services to clients [1]. An advantage of Six Sigma can be found in a variety of areas, including a reduction in process variability and an increase in productivity. Profitability, cost-cutting, and productivity gains, as well as a decrease in customer complaints, improved revenues and less complaints [2]. Within Six Sigma, there are key procedures and methods to guide projects, such as DMAIC (Define, Measure, Analyze, Improve and Control) as seen in **Error! Reference source not found.** [3].

Fig. 1 Six Sigma phases

2.2. Artificial Intelligence

The simulation of human intelligence processes by machines, particularly computer systems, is known as artificial intelligence. Artificial intelligence has a lot of algorithms and techniques. this research is based on Genetic Algorithm (G.A), Neural Network (N.N), Fuzzy Logic finally the supervised Machine Learning algorithms. [4]

2.2.1. Genetic Algorithm (G.A)

Genetic Algorithm (GA) is a search-based optimization technique on the principles of Genetics and Natural Selection. It is frequently used to find nearest optimal solutions for problems. that problems would take a lifetime to solve. [5]
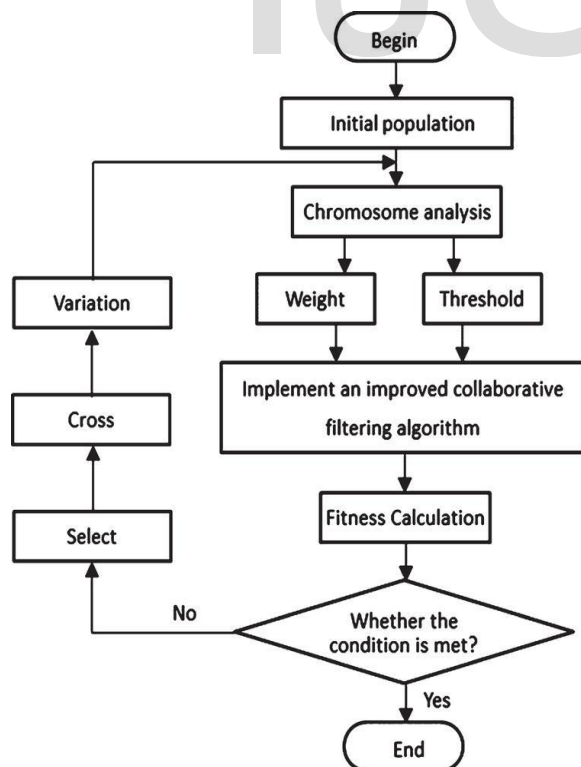

Fig. 2 Genetic Algorithm Flowchart

Error! Reference source not found. shows the basic steps of Genetic Algorithms (GAs). First, a population of random solutions is provided. For each chromosome in the population fitness function is evaluated. The chromosomes with the highest fitness values are more probably to be selected for reproduction using crossover and mutation. If the stopping criteria are not met the procedure is repeated by evaluating again the new population and so on. [6]. Six Sigma is a structured, project-oriented, data-driven technique and methodology for identifying and eliminating flaws in any process, from manufacturing to transactional and product to service. It's a management concept that aims to boost productivity and efficiency. It is distinguished by a thorough grasp of customer needs and the re-engineering of corporate processes [7] .Six Sigma marketing (SSM) is a fact-based, data-driven disciplined method to increasing market share by providing superior value to targeted products and markets [8] . SSM for marketing and sales are newer techniques to enabling and maintaining growth. Six Sigma's consequences are broadened to many outside organizational operations, as seen by its rise in numerous organizational activities. This comprises the organization's marketing and sales in terms of value addition and performance. Activities that ensure that the company continues to meet the needs of its customers while also receiving adequate value in return. [8]. (SSM) enables businesses to improve their strategic, tactical, and operational marketing operations. As a means of increasing revenue by improving the top line when it comes to marketing, Six Sigma can help. Leading indications of growth can be identified, and firms can take proactive measures to improve performance. One can turn to for a variety of performance-based metrics and quality essentials. [9] [10], as well as their references, [11] [12] Six Sigma Marketing is a link between marketing and quality improvement. This allows sales and marketing professionals to investigate the voice of the customer (VOC) and the voice of the business (VOB) in order to improve the quality of their processes. Six Sigma specialists and sales and marketing professionals both have the same goal in mind: to identify the route of least resistance and to stick to what works. Sales and marketing frequently rely on intuition and judgments, but Six Sigma exclusively relies on scientific data analysis. SSM for marketing and sales are newer techniques to enabling and maintaining growth. Influencing customers in such a way that they are motivated to choose the provided items or services are some of the object specific aspects of SSM. A technique that allows a business to focus its

limited resources on the biggest possibilities to grow sales and gain a lasting competitive advantage by removing the randomness from marketing and making it systematic and predictable [13].

Integrating a rigorous Six Sigma strategy with innovative marketing fields is the best way to satisfy the current marketing environment's needs. Six Sigma is increasingly expanding its horizons to other corporate activities as well; enhance the reputation for improving production environments. [13] explains the progress of Six Sigma over other quality tools for various organizational activities. Six Sigma Marketing (SSM) (Creveling) is the name of this management strategy. Applying Six Sigma to marketing will increase marketing's ability to deliver on, market requirements as perceived by customers, improve the efficiency and effectiveness of the marketing planning process, successfully manage marketing operations, provide transparency into marketing processes, improve collaboration between marketing and other groups within the business will be enhanced by applying Six Sigma to marketing. Six Sigma marketing (SSM) can achieve sustainability as a marketing tool for sustaining quality in the natural places [15].

2.2.2. Neural Network (N.N)

Neural networks are a new method of programming computers. They are exceptionally good at performing pattern recognition and other tasks that are very difficult to program using conventional techniques. Programs that employ neural nets are also capable of learning on their own and adapting to changing conditions. An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the biological nervous systems, such as the human brain's information processing mechanism. It has been applied to an increasing number of real-world problems of varying complexities. [7]
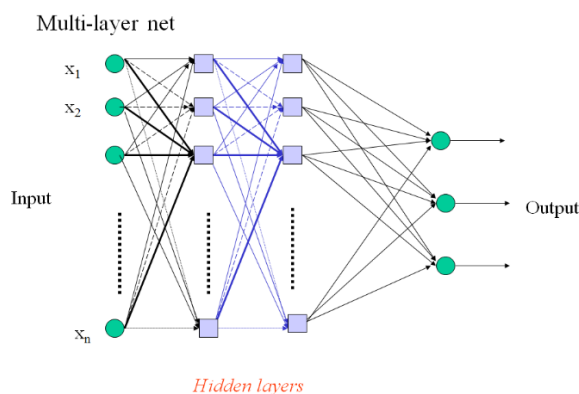

Fig. 3 Multi-Layer Neural Network

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Input Layer - The activity of the input units represents the raw information that Is fed into the network.

Hidden Layer - The activity of each hidden unit is determined by the activities of the input units and the weights on the connections between the input and the hidden units.

Output Layer - The behavior of the output units depends on the activity of the hidden units and the weights between the hidden and output units.

2.2.3. Fuzzy Logic

The methodology of Fuzzy Logic is similar to that of human decision-making. It deals with ambiguous and imprecise data. This is a huge simplification of real-world situations, and it is based on degrees of truth rather than true/false or 1/0, as in Boolean logic.

3. A PROPOSED MODEL

Better knowledge (management by fact) to make better judgments is one of the advantages of incorporating Six Sigma into marketing processes. Taking a more conservative approach eliminates the unpredictability that comes with marketing, which is a creative and dynamic discipline. Customer-product-financial linkages should be made easier with a marketing methodology. This criterion attempts a broad definition of marketing's obligations, starting with the creation of the offer and ending with the delivery of the offer

The research aims to propose the Sustainable novel system as Initial research followed by a series of applied research in the natural place as an optimum solution for sustaining it by achieving the following aims to provide a prototype framework in the in future ecotourism market, Identifying the weaknesses to be tackled as well as priority programs and activities to achieve for natural places. Seizing marketing opportunities that can be marketed within the tourism program to reduce costs for the tourist. Enhance and shedding light on weaknesses in the infrastructure for development sustainability for sources of income, especially in natural areas, to ensure the return from it to protect them for the future generations.

This research is important for the decision makers in government and private sectors, as well as marketers in the field of natural, environmental and public tourism companies' decision-makers in

the field of tourism marketing, especially natural areas, as well as decision-makers in the governmental organization to formulate policies that depend on sustainable development

A genetic algorithm suggested tool on the first applied

model based on natural genetics and survival of the fittest principles. They operate on a population of string structures that represent potential solutions in the search space using a simulated evolution process. Evolution takes place through (1) a survival of the fittest selection mechanism and (2) genetic recombination of the selected strings to produce children for the following generation. Second phase proposed an application model of Six Sigma Marketing business plan to maintain quality and profits of the natural places. A new methodology of thinking about economic and marketing problems will proposed using Fuzzy logic. Fuzzy sets have proven to be effective alternatives for customer behavior analysis since they provide a replacement for crisp values. These benefits may open up new avenues for addressing concerns of sustainable development. The result is an imitative model based on strategies and rules regarding appropriate/appropriable, natural places for its sustainability. The proposed technique of the model may change over time according to the results of each phase of investigation and experimentation. An approach according to different interconnected phases that may be adjusted according to the partial results of each phase. In third phase A proposed application model of Six Sigma Marketing (SSM) to apply the marketing the optimal strategy.

Neural networks have a number of advantages, some of which are listed below:
- Save data across the whole network.
- The ability to work with limited information.
- Exceptional felt tolerance.
- The term "distributed memory" refers to a type of memory that is
  - o Gradual Degradation.
  - o Machine training ability.
  - o Parallel processing capability.

Table 1 represent, a designing prototype using Six Sigma Marketing (SSM)

Define Phase: Identify and validate the green improvement potential in Marketing process.

Product and services: Competition unique benefits offered to the customers?

Price: How does price stack up next to competition? Do unique benefits or quality justify a higher price. And importantly, does it allow you a reasonable profit margin?

Place: dose it distributes by online or offline? Is the location convenient for the target market? have the product multiple locations, is each one profitable independently?

Promotion: How do you let people know about your business and the benefits you offer? This step is development of a marketing plan, using all this information to determine the most effective way to achieve your business goals.

Physical Evidence: that we are referring to here is anything that proves your business is real and operating within the law.

Decision phase for marketing mix is separated into two ways. First one is Popole business. That is only as grate as the people you choose to represent it; that's why this P is vital at every level of your business. Second is **Processes,** where decision what are the stages involved in getting your product or service to your customers? To guarantee that staff can execute these procedures to a high degree, you must assess which activities, functions, and tasks must be accomplished, in what order, and what is required logistically. This may necessitate the purchase of technology such as CRM, logistics software, and payment systems, among others.

Implementing marketing strategy and control
This phase will use the following techniques:
PEST Analysis: Is an acronym that stands for Political, Economic, Social, and Technological (analysis). PEST analysis is used to assess these four external factors in relation to your own company.

SWOT Analysis: It is a simple, yet powerful, technique used by businesses globally in order to assess and adjust their current position before finalizing their strategy. SWOT stands for Strengths, Weaknesses, Opportunities, and Threats. This established method of analysis is the primary way that businesses position themselves and

determine how aligned they are with their vision, goals, growth trajectories, and success benchmarks.

Competitor Analysis: it is a strategic method of determining any current or future threats posed by other companies to the prosperity of your business. This analysis considers multiple factors in an attempt to highlight the strengths and weaknesses of a potential competitor and how these compare to your own businesses.

Marketing business plan ,Developing the action plan

- Setting up the goals and vision
- Setting up the mission statement
- Objectives of the firm

The second step entails the observation of the current situation. This is a subset of long term and strategic planning processes in order to observe the current situation, the resources company holds depict the direction in which the company is moving.

Monitor the current position

Through marketing

- audit and monitoring
- SWOT analysis

Developing a strategy for Marketing

- Marketing Mix
- Designing objectives and strategy for marketing
- Vehicles and sources of communication
- Observe the alternative strategies and processes for marketing available

This involves making the marketing strategies and objectives in order to gain the overall objective of the firm. This involves observing the marketing tactics which fit the best for the promotion of the business.

TABLE 1
PROTOTYPE SIX SIGMA MARKETING (SSM)

SSM	Six Sigma Marketing (SSM)						
	D	M	A	I	C	D	
Marketing process	Define Phase	Measure phase	Analyze phase	Improve phase	Control phase	Decision phase	
Marketing mix	Product and services	Price	Place	Promotion	Physical Evidence	People business	Processes
Implementing marketing strategy and control	PEST Analysis	SWOT Analysis	Competitor analysis				
Marketing business plan	Developing the action plan		Monitor the current position		Developing a strategy for Marketing		

4. CONCLUSION

On determining the customer experience, while customers of the natural place's companies give more emphasis on the following elements of the marketing mix in the descending order: "process, price, product, physical evidence, people, place/distribution, and promotion" when evaluating their experience in the natural fragile places.

The natural fragile places need to implement a flexible management model application to manage sustainability in a natural place for their market share and sustainability

A dynamic system is needs to face the capacity challenge that increasing every day to meet the production that will affect the growing demand for feed and bioenergy while conserving biodiversity and reducing the pressure on natural resources and ecosystems.

Based on proposed model, the management strategies and rules regarding appropriate/appropriable urbanization,

typological schemes, and integration of solar systems, production approaches, facilities, technologies and materials. Lean Six Sigma framework application as marketing tools to gain sustainably that can adopted in the natural places by a dynamic system to face the capacity challenge that increasing every day to meet the production that will affect the growing demand for feed and bioenergy while conserving biodiversity and reducing the pressure on natural resources and ecosystem.

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