

# A PROPOSAL FOR AN INTEGRATED MARKETING FRAMEWORK FOR EMERGING HIGH TECHNOLOGIES

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## ABSTRACT

*The waves of change and rapid development of high tech products force industries and firms to seek new ways to compete and survive. Just as a cyclone of emerging new products seem to influx the market, new strategic business planning are discussed in many research area. Knowledge of this important domain of high technology marketing strategy remains limited and relatively small amount of literature, most of which is found in a few general marketing textbooks, addresses this specific topic. This paper therefore aims to develop a strategic integrated marketing framework that is workable in the convergence for high tech product, services, information and experiences. It focuses on renewable energy business perspective ocean thermal energy conversion (OTEC) that converts the heat trapped in the surface of the ocean at temperate regions and converts it into energy at a designated temperature. This paper adopts qualitative approach in its efforts to explore a new body of knowledge in strategic high tech marketing mix focusing on the themes derived from marketing environmental forces and framing an innovative solutions for the sustainability of emerging high tech business milieu in Malaysia.*

**Keywords**— emerging technology, high tech marketing, OTEC

## 1. INTRODUCTION

### 1.1 Background of the study

Technology new waves has begun to develop rapidly in this millennium. The waves of change and towering development of high tech products force industries and firms to seek new ways to compete and survive. Just as a cyclone of emerging new products seems to influx the market, new strategic business planning are discussed in many research area. Interesting and promising new technologies are widely discussed academically and within industries, vigorously written in printed and non-printed issues and publications over the years.

Along with the instrumental perspective (which is often categorized into the classic marketing instruments of product, price, promotion, and place, "4 p's", McCarthy

today also sees the inclusion of an institutional perspective placing the marketing particularities and characteristics

found in different industries at the forefront [1]. This paper studies how to bridge emerging technology and high tech marketing for renewable energy industry.

Regis McKenna, a well-known consultant and author in the areas of technology and marketing, states that hi-tech industries are characterized by complex products, large numbers of entrepreneurial competitors [2]. customer confusion and rapid changes. McKenna and William Davidow are the pioneers in the area of high tech marketing and made names for themselves in Silicon Valley, USA. McKenna addresses the aspects of communication, while Davidow takes a more comprehensive look at the topic of high tech marketing[3].

Emerging high technology (EHT) may not be entirely the latest technology innovations. This is one of the main misconceptions about EHT. Technology can still be considered emerging in one context even though it has been considered established in another [4]. The context here is related to place, domain, or application of the EHT.

This paper aims to define and conceptualize the characteristics of EHT. To limit the scope, this paper will consider EHT within the marketing of renewable energy business:OTEC, conversions of the heat trapped in the surface of the ocean at temperate regions and transforms it into energy at a designated temperature[5].

This paper is organized as follows: definitions on emerging high technology, the characteristics of high tech marketing characteristics and discussion, conclusions, as well as recommendations for future research.

### 1.2 Statement of Problem

Marketing has been practiced since ancient times and developed over decades. Yet, it is only during the 20th century that marketing ideas evolved into an academic discipline in its own right [6]. Most concepts, issues and problems of marketing thoughts have fused into one of

several schools or approaches to understanding marketing[7]. Early in the discipline's history, the study of functions, commodities, and institutions emerged as complementary modes of thinking about subject matter and became known collectively as the 'traditional approaches' to studying marketing. About mid-century, there was a 'paradigm shift' in marketing thought outshining the traditional approaches as a number of newer schools developed: marketing management, marketing systems, consumer behavior, macro marketing, exchange, and marketing history [8].

There is a need to provide an up-to-date synthesis of empirical literature on marketing and innovation and understands its process as strategic marketing planning for EHT particularly in renewable energy industry[9]

However, in this study it is paramount to specifically clarify and specify high technology. Mohr et.al argues that there are two reasons why it is important; due to the impact of technologies on economy, attempts are made to classify economic production and incomes; due to impact of technology on the environment standard marketing strategies are being modified and adapted, therefore, it is necessary to know the product to focus on[10].

There are not many literatures in marketing issues for emerging high tech industry. The researchers in 1980s discovered that the challenge to marketing management if high tech results from the needs to work cooperatively at least to some degree with the research and development (R&D). Enkel at al discovered that it is less reached yet increasingly important phenomenon [11]. Leslie in her research found that one potential reason for the inconsistent results within the literature is that some studies focus on either product or process innovations, while others do not make the distinction and instead lump the two types [12].

On innovation, scholars have pointed out that past research in this technological marketing arena has largely been inconclusive, inconsistent, and lacking explanatory power. In marketing, Meldrum have also mentioned that many still do not provide a simple framework of key marketing management issues to be addressed by high-tech marketing professionals, or paradigms which will assist them in modelling their marketing activities and over recent studies[13].

The research is expected to answer questions and provide reasons responsible for undertaking the particular research especially for marketing OTEC.

No significant work has been done on the subject in Malaysian high tech renewable energy industry. Therefore, the need to carry out this research will answer the given scale of the forecasted problem facing the marketing issues in the OTEC industry in Malaysia.

### 1.3 Objectives of the study

The study aims:

- To conceptualize High Tech Marketing
- To develop a marketing framework that is workable in convergence for high tech product, services, information and experiences from a renewable energy business perspective: ocean thermal energy conversion (OTEC)

The Objectives:

- to explore and understand high tech development
- to evaluate high-technology marketing models influencing high-tech product development

and finally,

to develop and propose a comprehensive and integrated marketing framework for high-technology

### 1.4 Research Questions

The research questions will address the followings;

What are the characteristics and particularities of high technology?

What are the emerging high technologies (EHT) in OTEC industry?

Is OTEC an emerging technology?

What are the barriers faced in marketing EHT within the global OTEC industry?

When is the best stage for marketing OTEC as the new emerging technology?

Would a heuristic process during the new market entrant stage be able to penetrate a new OTEC market?

What are the existing marketing strategies and models used for OTEC spins off product in Netherlands, Japan and Korea?

Were the media propaganda and PR strategy used in reaching the OTEC stakeholders in Netherlands, Japan and Korea?

## 2. DEFINITION

The characteristics of high tech marketing need to be defined accordingly and linked to the underpinning research area.

### 2.1 Emerging technology

Emerging technologies (ET) have been frequently termed by researchers to mark latest innovations. Yet, one of the main challenges when investigating ET is the fact that the term is in many cases not well defined and is often misunderstood [14].

### 2.2 Marketing

Then 2008, the American Marketing Association (AMA) adopted the following as its new official definition of marketing "Marketing is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large." [15] The Chartered Institute of Marketing in 2007 outlines marketing as the management process responsible for identifying, anticipating and satisfying customer requirements profitably [16].

It's all about giving maximum values to the customers and satisfying them. Kotler delineates marketing as the process by which companies create value for customers and build strong customer relationships in order to capture value from customers in return [17]. *Marketing is* defined as the right message to educate and influence the right consumers, finding the right methods and processes at the right time to convince them why they should choose your product and services over your competitors.

### 2.3 Ocean Thermal Energy Conversion

Ocean thermal energy conversion (OTEC) that converts the heat trapped in the surface of the ocean at temperate regions and converts it into energy at a designated temperature [18].

## 3. LIMITATIONS OF THE STUDY

OTEC is an emerging technology in Malaysia, there is very little literature regarding the effective planning and management of this technology. The area focussed is primarily on the market entrants and awareness promotional stage.

The scope of the study will only be focused on the framework with regard to the followings:

- The terms, definitions and classifications of high tech marketing orientation. It will be used throughout the research to represent the concept of

industrialisation, although the term industrial marketing have been used elsewhere .

## 4.0 SIGNIFICANCE OF STUDY

Malaysia may capitalize on its suitability to develop this new industry, hence creating significant value to the local economy and society. The secondary data gathered from OTEC experts assisted the research since 2014. According to a short interview with Professor Luis Vega recently, there is a significant need to synthesize high tech marketing models and planning strategies on stakeholder's awareness for this new emerging technology [19].

## 5. RESEARCH METHODOLOGY

This study has applied the qualitative research design. Quoting Creswell there were three factors that the researcher should be involved in: preliminary considerations at the commencement of the assignment, the steps to be engaged in and finally the flow in getting the findings [20]. This case study research involves the written report of a sheath within a real-life, contemporary context or setting [21] The first preliminary data-gathering activity were gathered from an OTEC focus group workshop through semi-structured interviews, observations, document analysis, and secondly from the OTEC international symposium held from the 1<sup>st</sup> to 2<sup>nd</sup> of September 2015.

The preliminary findings from the focus group gathered interviews via recent OTEC workshop in Malaysia, some common characteristics that all high-technology industries shared. Most notably, market uncertainty, technological uncertainty, and competitive volatility were addressed similar as what have been studied by Mohr et al as discussed previously.

Also to note, the preliminary findings have contributed on the themes that is deemed necessary for future completion of this study.

## 6. DISCUSSIONS

This study cover the areas that can answer the research questions imposed and suggest an integrated high tech marketing framework that is feasible and doable. Doubtfully, the notion of high tech marketing characteristics have not been thoroughly discussed in any academic work nor industry in Malaysia.

High tech marketing can generally be understood as having its overall strategic and operative decisions and resulting marketing activities directed towards high tech markets [23].

### 6.1 The emergence of high tech marketing, the term and its characteristics

The question in this study are regarding what "high tech" is, and which characteristics it has, particularly when it comes to marketing.

### 6.2 Market Uncertainty

Market uncertainty refers to ambiguity about the type and extent of customer needs that can be satisfied by a particular technology as posited by Moriarty & Kosnik [24]. Market uncertainty arises first and foremost, from consumer fear, uncertainty, and doubt about what needs or problems the new technology will address, as well as how well it will meet those needs. Anxiety about these factors means that customers may delay adopting new innovations, require high degree of education and information about the new innovation, and need post-purchase reassurance and reinforcement to assuage any lingering doubt. Second, customer needs may change rapidly, and in an unpredictable fashion, in high-tech environments. Third, customer anxiety is perpetuated by the lack of a clear standard for new innovations in a market. Fourth, due in large part to the prior three factors, uncertainty exists among both consumers and manufacturers over how fast the innovation will spread. Finally, Mohr et al in 2005 stated that uncertainty over how fast the innovation will spread contributes to an inability for manufacturers to estimate the size of the market [25]

### 6.3 Technological Uncertainty

Moriarty & Kosnik posit that technological uncertainty is “not knowing” whether the technology – or the company providing it – can deliver on its promise to meet specific needs (26). Mohr, Sengupta and Slater continue by defining which factors give rise to technological uncertainty[27]. The first comes from questions about whether the new innovation will function as promised. The second source of technological uncertainty relates to the timetable for availability of the new product. Third technological uncertainty arises from concerns about the supplier of new technology. Fourth, the very real concern over unanticipated consequences or side effects also creates technological uncertainty. Finally, in high-tech markets, technological uncertainty exists because one is never certain just how long the new technology will be viable – before an even newer development makes it obsolete. As a new technology is introduced, its performance capacity improves slowly and then, because of heavy R&D efforts, improves tremendously, before reaching its performance limits.

### 6.4 Competitive Volatility

A third characteristic that underlies high-tech markets is competitive volatility. Competitive volatility refers to

changes in the competitive landscape: which firms are one’s competitors, their product offerings, the tools they use to compete.

### 6.5 High tech product development concept

Zemlickiene suggests that in order to formulate high tech product development concept, it is necessary to provide the definitions of high-tech products. He concluded that high tech products are complex, advanced, requiring specific technical know-how, which is technologically discontinued and have many personnel with huge investment in research and development. He posit

According to Mohr et al yet again the kind of marketing strategy depends on the type of innovation. He posits that the product’s chances to succeed greatly increase if marketing strategies, tools and types of innovations are appropriately composed.

Here, the strategies for marketing high tech for OTEC are conceptualized.

### 6.6 Conceptual Framework

It is envisaged that the study undertaken will create an integrated marketing formulation model, depicting the strategic relations between the business/ market opportunities, product/ service, experience and information provided, and technology needed to support the industries derived from OTEC. McCarthy posits high technology marketing should be different but the classic marketing instrument of product, price, promotion, place (marketing mix) still remains as core. Integrating marketing theories like marketing mix, product life cycle, and situational behavior theory blend an imperious strategy for OTEC’s emerging technology.

The product life-cycle theory is an economic theory that was developed by Raymond Vernon [28].

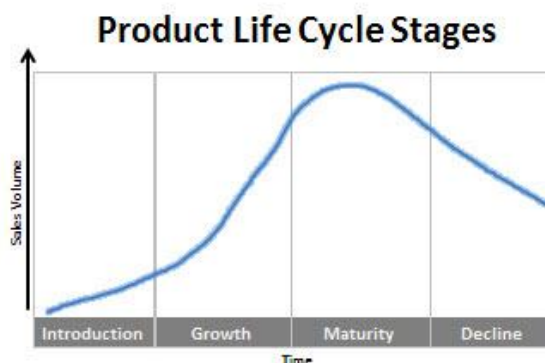


Figure 1

The product life cycle has 4 very clearly defined stages, each with its own characteristics that mean different things for business that are trying to manage the life cycle of their particular products.

**Introduction Stage** – This stage of the cycle could be the most expensive for a company launching a new product.

**Growth Stage** – The growth stage is typically characterized by a strong growth in sales and profits, and because the company can start to benefit from economies of scale in production, the profit margins, as well as the overall amount of profit, will increase

**Maturity Stage** – During the maturity stage, the product is established and the aim for the manufacturer is now to maintain the market share they have built up.

**Decline Stage** – Eventually, the market for a product will start to shrink, and this is what’s known as the decline stage.

Models of product market entry have long discussed over the years but arguably, for this research, the focus would only be focused during the introduction stage.

Table: Conceptual Framework

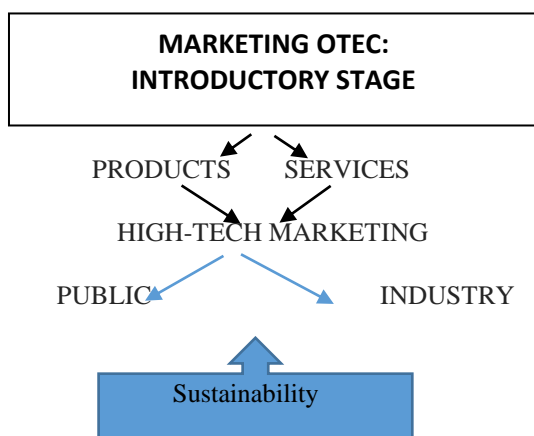


Figure 2

One important finding from the review of the OTEC literatures and discussion with OTEC experts and firms recently were that the proper format for dealing with the basic questions in this study was in the context of the “environment ± strategy ± performance” link [29].

This study aims at proposing a strategic integrated marketing framework that links the environment, sustainability and performance in OTEC business from the market entrant stage.

### 6.6 Energy from the Ocean

The goals for UTM-OTEC to develop strategic model are following the notion put up by Professor Dato Abu Bakar Jaafar, a renowned researcher in energy at his on research on market penetration and commercialization [30].

Table: Commercialization, Development and Research (CDR) versus the traditional RDC model.



Figure 3

Besides getting the commercialization buy-ins from government agencies and private sectors, the heuristic marketing strategy is to create awareness to the mass where everyone is forced to ‘digest’ what OTEC is and share this latest frontier for the sake of national interest and for the progress of the world.

Ocean Thermal Energy Conversion (OTEC) is a process that employs the natural temperature difference between the surface and the depths of the ocean. First introduced in 1881, OTEC has been described as an effective and renewable energy source. [31]

Professor A Bakar deliberated that OTEC is harnessed through the heat from the Sun stored in the oceans and the adjacent deep seas wherever there is a significance temperature differential over 20 degrees Celsius. Geographically OTEC is best placed at temperature region. In Malaysia, the Sabah Trough has been identified as the best place for OTEC to commence. Introducing OTEC technology to the public in Malaysia and the world at large needs a strategic approach. According to Professor Vega also,

“The vertical temperature distribution in the open ocean can be represented as two layers separated by an interface. The upper layer is warmed by the sun and mixed to depths of about 100 m by wave motion.

The bottom layer consists of colder water formed at high latitudes. The interface or thermocline is sometimes marked by an abrupt change in temperature but more often the change is gradual. This implies that there are two reservoirs providing the heat source and the heat sink required for a heat engine. A practical application is found in a system designed to transform the thermal energy into electricity. This is referred to as OTEC for Ocean Thermal Energy Conversion”

A distinct feature of OTEC should be shared to most the OTEC stakeholders. Professor James E. Grunig in University of Maryland, College Park, defines situational theory of publics can be identified and classified in the context to which they are aware of the problem and the extent to which they do something about the problem. This theory explains when people communicate and when

communications aimed at people are most likely to be effective.

Leveraging on the media channel was one of the approaches used as an integrated marketing process to get the public buy-ins. Product image (reputation) has grown in importance since the 1985 study. Thus, the need for a conventional channel to reach the mass is still applicable in this internet era. It is a fast problem solving agenda to penetrate a new market and do it heuristically. The concept was originally introduced by Nobel laureate Herbert A. Simon where the primary object of research was problem solving. It is also an approach to learning, or discovery that employs a practical methodology not guaranteed to be optimal or perfect, but sufficient for the immediate goals. That is, to get the OTEC notion across globe. The public needs to be educated and teased on OTEC. The by-products such as the conversion of electricity and deep sea-water usage are two notions that can easily be penetrated.

OTEC offers one of the most benign power production technology. Extensive discussions with OTEC counterparts from Japan, Korea and the Netherlands during the OTEC symposium held in Kuala Lumpur were the platforms of opportunity to further understand how OTEC penetrated the market. Professor Ikegami of Saga University and Dr Hyeon Ju Kim of Korea Research Institute of Ship and Ocean and Ocean Engineering (KRISO) and Ms Anne Sophie of DCNS Netherlands had managed to share their initial marketing efforts and barriers faced during the early market entrant stage.

## 7. CONCLUSION

Emerging technology, high tech marketing and its particularities are characterized by uncertainty, Technological uncertainty, and competitive volatility. Persuasions and media propaganda on OTEC are needed further discussed to proceed in this research.

An integrated new body of knowledge in strategic high tech marketing mix focusing on the themes derived from marketing environmental forces and framing an innovative solutions for the sustainability of emerging high tech business milieu in Malaysia is proposed. Studies by the OTEC researchers on the by-products of OTEC: electricity production and deep sea water are identified to attract industry players to participate[32]. Target market determination and segmentation are major elements of strategic high tech marketing 1994. Hence, for further studies, arguably the integration of the high tech marketing mix in promotional activities are paramount during the market entrant stage of OTEC spins-off products especially the electricity and deep sea water.

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