MARKETING

IN CUSTOMER TECHNOLOGY ENVIRONMENTS

Prospective Customers and Magical Worlds

DEVANATHAN SUDHARSHAN

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Marketing in Customer Technology Environments: Prospective Customers and Magical Worlds

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INVESTOR IN PEOPLE

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Preface/Acknowledgments/Dedication

Preface

I was motivated to write this book by my own experience which, given that these CTEs are rather recent and are still emerging, is albeit somewhat limited. My experience with the various new forms of technology-based environments were magical, to say the least. I could see how my life as a customer would not be the same again in these new technology environments and that Marketing Managers and budding Managers would benefit from a book devoted to Marketing in these new environments. I felt that readers would benefit from knowledge regarding the new environments and the technologies whose development and deployment will help shape the diffusion and utilization of the emerging environments. In addition, I felt that the new customer environments called for providing knowledge on customer behavior supplemental to what is traditionally available in books on Marketing Management. After the first chapter that introduces the book, the next chapters intend to set the customer context for the discussion of specific customer technology environments (CTEs) that follow.

For these early chapters, I searched for and found new perspectives on human behavior that would enrich the discourse that traditionally fills our customer/consumer behavior textbooks. The Homo Prospectus approach seemed to fill that need effectively. It incorporates a view of human decisions and actions as being the result of a mental preparedness to act, and in focusing on mental simulations as mental preparation it provides a significant role for new customer technology environments or CTEs. The feeling of wonderment I felt in CTEs, naturally, led me to search for work on wonderment and to the work on it in the emerging field of Magic Science. Both Homo Prospectus and Magic Science play significant roles in this book. I thank the scholars who are making this knowledge available to us.

The next chapters focus on CTEs themselves. We as customers are seeing the impact of tremendous discoveries, innovations, and inventions in computing, communications, manufacturing, miniaturization, and other technologies. Marketing Managers are in the midst of managing changes brought about due to the availability of "big data", its analysis, and the subsequent ability to personalize/customize customer relationships and offerings. In this book, I have deliberately chosen to focus on the emerging technology environments that customers will increasingly have access to and use and not on big data and its analysis. Several

books are now available on the use of big data in Marketing, Ecommerce, and Digital Marketing from which the interested reader will benefit. There, however, is a gap in the book space for books on the emerging CTEs. For managers and budding managers to be able to develop Marketing Strategies and practices for CTEs, I felt, that they needed to understand not only the CTEs but also some of the key enabling technologies for the CTEs. The book therefore focuses on the four exciting CTEs that are emerging as the key CTEs, namely, Virtual Reality (VR), Mixed reality (MR), Augmented Reality (AR), and Internet of everything (IoE). The rate of development and diffusion of these CTE books will depend on speed with which computing and communications infrastructures will embrace the four key enabling technologies: 5G, Edge Computing, Service-Oriented Architecture (SOA), and Artificial Intelligence (AI)/Machine Learning (ML). Therefore, this book also provides brief introductions to these enabling technologies.

I hope that this book will encourage Marketing Managers and students to take full advantage of the possibilities afforded by these new CTEs and seek to serve customers in the more fulfilling ways that the CTEs enable.

Acknowledgments/Dedication

I wish to dedicate this book to my family. I express my thanks and love to my wife Nalini who has been my constant companion in our journeys through space and time. To my wonderful parents Rajam and Kasturi Devanathan, who not only gave me life but also taught me to live and contribute positively to society, I offer my eternal gratitude. To our children Venkat, Amit, Sangita, Megan, and Adam who brought a greater purpose to my life – thank you and I wish you the best throughout your lives. To our grandchildren who will create their own realities and wonderment, I wish that your lives be fulfilling and full of productive creativity. I would also like to dedicate this work to the very many individuals who have played enormous roles in my professional life. They are, to name a few: My high school teachers Ms. Parvathi and Ms. Indira Jaganathan, and my class fellows at DTEA Lodhi Road, New Delhi. My Professors V.G.K. Murthy and Yegyanarayanan, and my class fellows at IIT, Madras. My Professors Bill King, Jerry May, Allan Shocker, and Gerry Zaltman, and my PhD student colleagues at the University of Pittsburgh. My Professor colleagues Ananth Negandhi, Lou Pondy, Jagdish Sheth, Seymour Sudman, Howard Thomas, and Rick Winter at the University of Illinois at Urbana-Champaign. My coauthors Olivier Furrer, Ravi Kumar, Ben Liu, and R. Venkatesh, and many other wonderful colleagues. I wish to extend a special thanks to the many executives with whom I have had the privilege to interact with, and who have taught me so much and to my many students who have shared their learning journeys with me. To the many others who have shaped me – a big thank you and I request your forgiveness for not naming you individually. I would be remiss if I did not thank Charlotte Maiorana at Emerald for captaining this book, as well as acknowledging the careful editing support provided by Emerald and Mohamed Imrankhan and his team at TNQ Technologies.

In closing, I offer a brief salutation to Saraswati for bestowing upon me the best of knowledge and learning ability; and to thank nature for allowing me to be its imperfect scribe on the topics covered in this book. In Sanskrit the salutation is:

"Saraswati Mahabhage Vidye Kamalalochane
Vishwaroope Vishaalaakshi Vidyam dehi namosthute."

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Chapter 1

Introduction

We ask Siri about the weather and ask Alexa to order us clothes, diapers, and garam masala. We can monitor and control access to our homes from miles away. We can dissect a human form without dissecting a cadaver. We can fly around Mt. Everest and feel the cold and walk on Antarctica ensconced in electromechanical gear. Soon, we can touch each other even though we are miles apart. Our imagination will be kindled. Imagine tomorrow. Will tomorrow feel magical, I wonder? Will reality tomorrow's experience be *realish*, I wonder?

For marketing managers, it is a fact that major technological innovations are changing the way we can serve our customers better. The technologies of interconnectivity, computation, sensors, mobile or wireless connectivity, machine learning, vivid virtual representations, and hardware interfaces are advancing rapidly. These advances require us to rethink how we can compete in this new environment and serve customers better. The information, communications, and computational technologies that are advancing so rapidly have four major new relevant technology bundles or technology environments – virtual reality (VR), augmented reality (AR), mixed reality (MR), and Internet of Everything (IoE). When these technology environments involve customers and their interactions, we shall call them customer technology environments or CTEs. These technology environments exist together as well as with existing environments (such as ecommerce, TV, print) and will work together in many instances. By some estimates the global VR and AR markets together are estimated to grow to be over $200 billion by 2022 (www.Statista, 591181). The global spending on IoE is estimated to grow to over $440 billion (Market Watch, 2018, Statista, 688762) by 2022.

Humility requires us to admit that technological change may create different CTEs that may dominate the marketing/customer landscape. However, for the CTEs that are covered in this book the technology landscape will be one of massive machine to machine (mM2M) interconnections. mM2M connectivity requires us also to consider the underlying infrastructure or enabling communications and computing technologies. We expect there to be few applications that are self-contained such as single-person games or

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dedicated maintenance apps and not needing real-time connectivity. Toward the end of providing readers with an overview of enabling technologies that will be necessary in mM2M applications, we have included a discussion of 5G communications technologies that will be required to provide ultrafast connectivity; service-oriented architecture (SOA) to provide interoperability across technology platforms/systems/machines; edge computing to provide the distributed computing required for mM2M environments; and artificial intelligence (AI) to provide the rapid insights and analysis required.

This book is written to provide readers with knowledge to approach these CTEs with confidence. To that end, the book provides overviews of each of the technology environments, describes customer models that are particularly relevant for these environments, and discusses the impact of these technology environments for marketing management. As mentioned earlier, a description is also provided of the enabling technologies that will make the upcoming magical words emerge from the laws of Maxwell and nature's propagation of waves.

Let us start by considering the four CTEs – VR, AR, MR, and IoE. They are introduced next.

VR CTE

It is a computer-generated 3D (three-dimensional) environment in which a customer gets immersed. To do so, the person must wear special equipment. Within the environment, the customer can interact with whatever enabled entities are in it. The type and extent of interaction depends on the equipment worn, the environment itself, and the extent and expertise of AI used.

AR CTE

Augmented reality is an environment in which computer-generated entities are superimposed on real worlds.

MR CTE

Mixed reality refers to environments in which virtual entities are superimposed on real as well as virtual environments.

The term "mixed reality" can be traced to Milgram and Kishino (1994). Exhibit 1.1 shows the Milgram and Kishino depiction of the continuum between purely (or wholly) virtual and purely (or wholly) real worlds. They termed the continuum a "virtuality continuum." They termed all environments in between the two ends as mixed reality environments. Environments that in more recent use are termed AR and MR are included in what Milgram and Kishino would call MR. It is also to be noted that, in their view, there could be a fourth environment called augmented virtuality (AV) in which real entities are superimposed on virtual worlds.

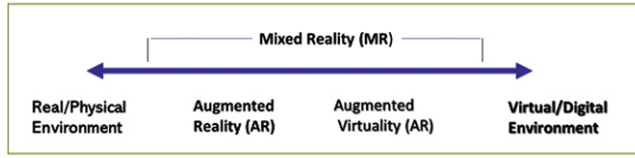

Exhibit 1.1. Virtuality Continuum of Environments. *Source:* Milgram and Kishino (1994).

Exhibit 1.2 shows how Microsoft (Bray, Schonning, & Zeller, 2018) views the continuum, with the continuum being anchored by physical reality on one end and digital reality on the other. Exhibit 1.2 also shows the devices such as mobile phones, holographic glasses, and immersive devices needed today for different environments on the virtuality continuum.

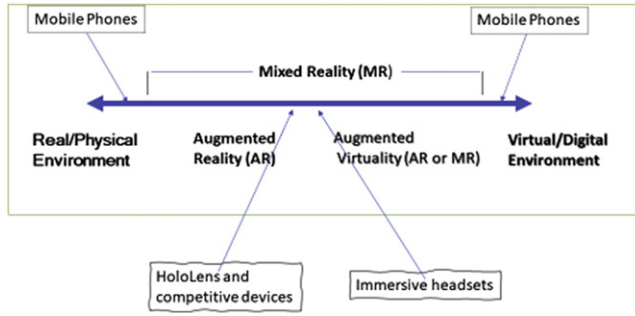

Exhibit 1.2. Devices Placed on Virtuality Spectrum. *Source:* Milgram and Kishino (1994), Fig. 1 and Adapted from Bray, Schonnine, and Zeller (2018), Microsoft.

Exhibit 1.3 shows example of Microsoft devices and experiences for different environments on the virtuality continuum.

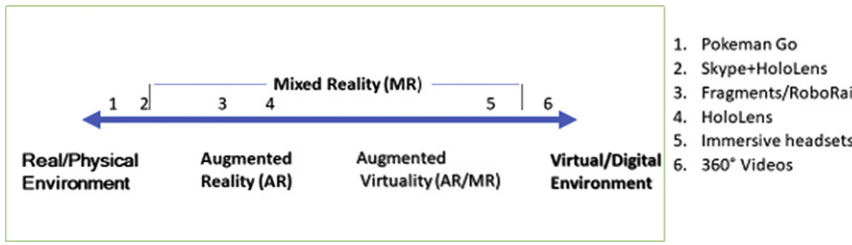

Exhibit 1.3. Experiences on Virtuality Spectrum. *Source:* Milgram and Kishino (1994), Fig. 1 and Adapted from Bray, Schonning, and Zeller (2018).

A number of companies, such as Vespa scooters, IKEA, Marriott, and Giraffe360, are using AR/VR as part of their marketing strategies. A number of major technology companies around the globe, such as Amazon, Apple, Google, HTC, Microsoft, Samsung, and Steam, are developing platforms, hardware, and applications for use in various environments along the virtuality continuum.

IoE CTE

When entities have at least minimal sensing and communication capabilities and are connected to a network of other such entities, they form an Internet of Everything. More typically each such entity will have a URL (uniform resource locator) or addressable and unique address, be connected to a network of other such entities, the network will itself have significant communication management capabilities, be connected to a big data storage system (perhaps in a cloud), and also be connected to big data analytics capabilities. Entities as a part of an IoE may range from those with minimal sensing and low power sending and receiving capabilities to those that have complex computing and very powerful communication (transmission and reception) capabilities.

One of the big differences between IoE and other CTEs is that a customer does not actively take part in it. For example, a startup Sidekick has developed AI that can learn about the individual using their own personal data. Having done so, by Summer 2021 the (AI) entity can help the individual make daily decisions. It runs on an individual's mobile phone. It can be connected to an IoE and can execute decisions on behalf of the individual on the IoE without the individual having to be present (https://sidekick.ai/). The capabilities planned for sidekick are:

> January 2019
>
> You can talk to your AI and it helps you make daily decisions.
>
> Winter 2019
>
> Developers can create new applications for your AI on our open platform.
>
> Spring 2020
>
> Your AI can talk and share your knowledge with millions of people.
>
> Summer 2021
>
> Your AI can talk with millions of other AIs and make data-driven decisions for you.

Each of these CTEs will be discussed elaborately in the chapters that follow.

To set the stage for the rest of the book, we introduce two abstractions. The first is an abstraction of the CTE–customer interaction and the second is an abstraction of marketing in these environments.

Setting the Stage 1: Abstraction of CTEs

A sketch of the interaction between a CTE and customers is shown in Exhibit 1.4.

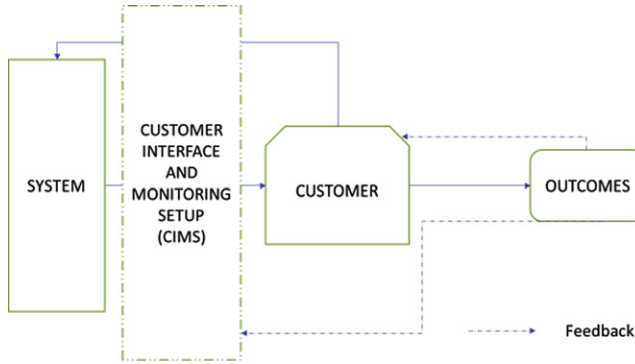

Exhibit 1.4. Sketch of Customer Technology Environment (CTE)–Customer Interaction.

A CTE is depicted in Exhibit 1.4 as consisting of two parts. The first is a system that is the bundle of the relevant technologies that define a particular CTE. The second is a customer interface and monitoring setup (CIMS). The technologies involved in each CTE are described in the chapter devoted to that CTE. While the system is owned by the focal marketing firm or its partners, part or all of the CIMS may be owned by customers.

The system and customers interact through a CIMS. The interaction results in outcomes. Feedback from these outcomes is obtained by the marketing firms through the monitoring part of CIMS. The abstraction depicted in Exhibit 1.4 envisages learning by both customers and by marketing firms during a session as well as over time.

Setting the Stage 2: Abstraction of Marketing Management

To provide more details of what the CTE–customer interaction processes are we need to have a common understanding of marketing in the new environments. Exhibit 1.5 presents such an understanding. In our understanding, marketing managers are viewed as making decisions that are guided and constrained by their firms' mission, values, strategy, goals, and resources. The decisions cover a

planning horizon which may in turn be broken into shorter action periods. For example, a 1-year horizon may be broken up into seasons, or months, or weeks. Importantly, we view that while the marketing manager has a planning horizon, the concern of the marketing manager extends beyond that period as we expect the firm to wish to survive and thrive even beyond that period. Our abstraction, based on our understanding, consists of four parts: objectives, tasks, learning needs, and key known heuristics.

- Maximize profit (or ROI/ROA) over all customers over a planning horizon with the expectation of continuation to more horizons
- From a universal portfolio of offerings
  - To present a subset of combinations of relationships, offerings to each customer at the right time
  - Adapt combinations presented based on monitoring of feedback
- Selection of subset of combinations to be presented is based on
  - Probabilities of choice
  - Probabilities of positive experience
  - Profit if chosen
- Key known heuristics
  - Segmentation-Customers may be grouped based on similarities in preferences
  - LTV- Segments can be prioritized in terms of their life time value
  - Positive experience increases future probabilities of choice and experience
  - Timing varies by customer within segments

Exhibit 1.5. Abstraction of Marketing Management.

Objectives

For a planning horizon, marketing managers maximize profits (or revenues as their firm's goals may be) and/or return on resources [return on assets (ROA), or return on investment (ROI)] by presenting customers with a portfolio that consists of relationships and offerings at appropriate times.

Tasks

Offerings are made up of customer value drivers including products, prices, branding, financing, communications, delivery, after sales service, and problem-solving service. The portfolios presented are adaptive, in that they adapt at a microlevel within every interactive session with a customer as well as over the entire planning horizon. Such adaptations are based on learning customer information such as preferences, beliefs, expectations, goals, and appraisals. In order to present a customer with an appropriate portfolio, the firm needs to be able to anticipate the portfolios that may be needed in as much as these portfolios require arrangements for supply chains, manufacturing, production of what is valued (including what are commonly referred to as services), or other infra-structure requirements. The firm, therefore, needs to have developed a universal portfolio of offerings from which it can present a subset to each customer during any given interaction, and perhaps, the subset can be modified by choosing a different one from the universal portfolio even during a session.

Learning Needs

The selection of the subsets to present is made based on the likelihood of the subset being chosen, the likelihood that the chosen subset will lead to a positive appraisal and experience, and that the customer's business will be profitable for the firm over the time horizon. On this last point, firms may differ from some requiring that every session that concludes with a transaction end with direct profit being achieved, versus others who may choose that profits from a customer are calculated over a planning horizon or some part thereof. The firm also needs to have knowledge of customer preferences for timing of interaction.

Key Heuristics

Marketing managers use knowledge developed in the discipline over decades. The key heuristics that drive their strategic approach are four in number.

The first is that while customers are unique, there is enough similarity between their preferences that they can be grouped for the purposes of developing and updating universal portfolios of offerings. Customers who share similar preferences are collectively referred to as a segment. A key assumption is that of limited resources and therefore of choices having to be made on the universal portfolio that a firm can present and serve successfully.

The second key heuristic is that firms prioritize customers in terms of their lifetime value (over the planning horizon) in their universal portfolio development and in developing relationships with them. Again, such a prioritization is needed only because of resource constraints. The ability to estimate the lifetime value of customers requires that the firm has knowledge of customers in terms of their probabilities of choice of different offering sets, their likely satisfaction with their choice. The firm should also know the likely profit (ROA/ROI) from such choices.

The third heuristic is that customers will only transact with a firm from which they expect to get a positive experience. Such expectations can be based on past personal experience or learned from others. Therefore, profitability over a planning horizon from a customer depends on an ongoing set of positive experiences with the firm and its offerings.

The fourth key heuristic is that the times at which a customer will need interactions and make choices will vary from customer to customer. While there may be some common general time preferences in a segment or group of segments, such as gift buying during holidays (which may vary from country to country, Christmas, Deepavali, Lunar New Year, Hanukah, etc.), the specific time of interaction will vary across customers.

The two abstractions, one of CTEs and the other of marketing management, allow us to sketch out a CTE–customer interaction process that will further inform marketing management in the world of CTEs.

CTE/CIMS–Customer Interaction Process

The interaction between a customer and a CTE is sketched out in Exhibit 1.6. The sketch sets out in a little bit more detail what marketing activities a

CTE will engage in as well as the customer decision process during an interaction. Any session is likely to involve many actions on behalf of the firm as well as much information processing and decision-making by the customer.

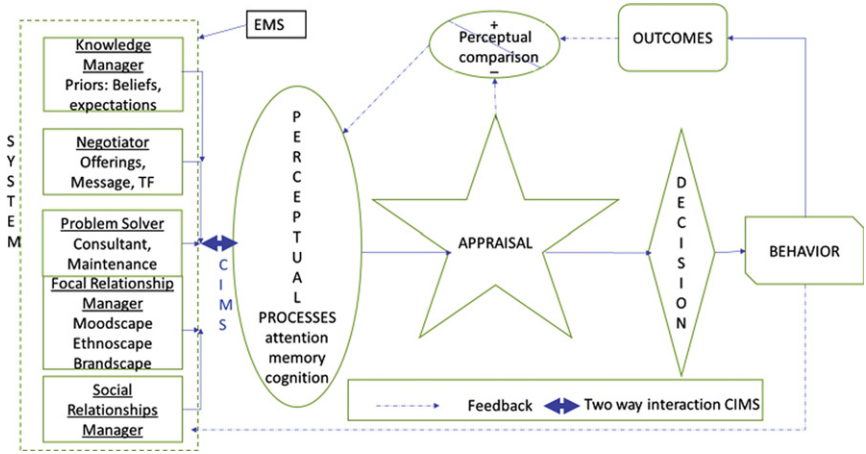

Exhibit 1.6. Sketch of CTE–Customer Interaction Process.

The interface between the firm as represented by a CTE and a customer is called CIMS, for customer interface and monitoring setup. As the name suggests, CIMS consists of two parts. First, CIMS acts as the mechanism by which a CTE and a customer exchange information. Any physical transfer of material (say a good or currency) is expected to be carried out by other means. Money, or financial consideration, may be exchanged within a CTE. A financial transaction is also considered as exchange of information. The exchanged information being what needs to be transferred, by whom to whom, when, and in what currency, and, that a transfer has taken place, when it occurred, and other transfer details. Second, CIMS acts as a monitoring system. It is the mechanism by which a CTE monitors information regarding the customer. It is, therefore, critical to the firm's ability to learn, adapt, and optimize its relationship with the customer over the relevant planning horizon. A CIMS may use sensor on entities that come into contact with or are used by a customer, such as sensors on smart light bulbs in the context of an IoT or IoE. It should also be noted that a CTE may be connected to an environmental monitoring setup (EMS) which monitors the broader environment beyond a customer.

Based on our abstraction of CTEs and marketing management the roles within a CTE are (1) knowledge management, (2) negotiator, (3) problem solver, (4) focal relationship manager, and (5) social relationship manager. While these are distinct roles, for an effective and efficient management