



# Geographic information systems as a marketing information system technology

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## Abstract

Marketing information systems (MKIS) are decision support systems targeted at marketing-specific decisions. One of the most widely disseminated MKIS models divides the marketing decision universe into four domains and links these domains to each other and to other marketing activities. Unfortunately, there is little guidance on the construction of specific MKIS targeted at problems in these domains or to the construction of integrated MKIS that span domains. This paper advocates the use of geographic information systems (GIS) as a DSS generator for constructing MKIS. The paper reviews the technical capabilities of GIS and shows how these capabilities align with accepted elements of MKIS. We see that a unique advantage of GIS over other MKIS technologies is its ability to integrate information from disparate sources and spanning multiple decision domains when a single decision requires this capability. The paper then uses a decision making resource-based approach and the four elements of the marketing mix to propose a research agenda for increasing our understanding of GIS as an MKIS technology. © 2003 Elsevier B.V. All rights reserved.

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<sup>1</sup> There are two competing acronyms for “Marketing Information Systems.” The natural acronym, “MIS,” is sometimes used [5] but can cause confusion with the longer standing acronym for “Management Information Systems.” Some authors define MKIS as a subset of a larger group of marketing management support systems (MMSS) (see Wierenga and van Bruggen’s [36] excellent taxonomy) while most use MKIS in a broader context. We adopt this latter approach for consistency and also because this paper’s concepts apply to almost any sort of computerized marketing-oriented decision support system.

## 1. Introduction

The concept of marketing information systems (MKIS)<sup>1</sup> originated in the 1960s as a technique for applying new (at the time) data processing technologies to marketing-specific decisions. In many ways, the history of MKIS has paralleled that of MIS with new technologies and new conceptual approaches extending the support provided to decision makers. Unfortunately, though, specific techniques for constructing MKIS have not delivered on the potential

inherent in the MKIS idea [32,33]. One indicator of this phenomenon has been a decline in the coverage of MKIS in the Marketing literature in the 1990s, though interest in the concept has become more pronounced in mainstream MIS journals such as this one.

This paper asserts that a new use for an increasingly popular information system technology can fundamentally alter the cost and effectiveness of marketing decision making. The technology, Geographic Information Systems (GIS), uses stored data to create customized computer-based maps showing location and attribute information about objects of interest to a decision maker. In particular, GIS is a specific software technology that Sprague and Carlson [31] call a decision support system generator, a tool used to create decision support systems (DSS) for use with specific decision making needs. DSS have been shown to be important tools for supporting marketing operations [4,8,15,24,26] and a DSS generator with capabilities directly relevant to marketing decision making is especially valuable.

GIS provide value for marketing decision making through two mechanisms:

1. GIS provide a way to *analyze* internal or external marketing intelligence data in a format particularly suited to marketing decision making; and
2. GIS provide the ability to *integrate* both internal and external marketing intelligence data to greatly improve the effectiveness of these marketing decisions.

This paper will show how these capabilities result in a competitive advantage through the ability to leverage internal data and specific knowledge of market factors through the easy application of effective visualization techniques and the integration of external data. To the extent that the firm can internalize and institutionalize these capabilities, the firm's competitive advantage may become both sustainable and strategic. Further, the paper will show that these capabilities have important implications not only for marketing practice but also for research.

We begin the paper by reviewing marketing information systems and introducing a framework that organizes the rest of the paper. Next, we provide some background on GIS and highlight some of the most relevant technical capabilities. This discussion high-

lights the specific data visualization and integrating capabilities and stresses their use in marketing decision making. Next, we use the MKIS framework to examine the usefulness of GIS with respect to specific elements of an MKIS. We then revisit the same GIS capabilities in terms of the 'Four Ps' of marketing, product, pricing, placement (location), and promotion and see that these capabilities are relevant from this perspective as well. Finally, we will examine how the capabilities of modern GIS can affect both theory and practice in marketing and outline some issues for future research.

## 2. Marketing information systems

Kotler defined a marketing information system as,

... a structure consisting of people, equipment, and procedures to gather, sort, analyze, evaluate, and distribute needed, timely, and accurate information to marketing decision makers. [17, p.110]

We admire the comprehensiveness of this definition and find that some other definitions are either more restrictive in purpose or less comprehensive in scope, resulting in less flexibility in a system's goals and capabilities. Furthermore, Kotler's definition is independent of any specific computer technology. He also suggests that the potential components of an MKIS can be included or not, added, or enhanced to suit the decision maker's needs. Finally, Kotler's definition provides for two types of systems familiar to MIS practitioners, *specific DSS* and *ad hoc DSS*. A specific DSS is a semi-permanent system that provides recurring decision making support to its users (in line with Sudman and Blair's [34, p.30] definition of a MKIS), while an ad hoc DSS is developed for limited, sometimes one-time, use on a specific problem.

Wierenga and van Bruggen [36] provide a richer taxonomy of what they call Marketing Management Support Systems (MMSS). Their taxonomy includes MKIS as a specific subtype of MMSS along with seven others including Marketing Expert Systems, Marketing Neural Nets, etc. In our review of the literature, however, we have found that "MKIS" is the dominant term applied to marketing-oriented information or decision support systems. We will there-

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