Chapter 69

Geographic Information System Effects on Policing Efficacy:
An Evaluation of Empirical Assessments

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ABSTRACT

GIS technology is credited with substantially improving police crime analysis and related resource allocation. Although GIS has been said to be an efficient and effective technology in policing, limited empirical assessment has been conducted. An examination of functions and a review of the literature suggests four major applications of GIS in policing: computerized crime mapping/crime analysis; "hot spots" identification; improving command-level decision making; and geographical investigative analysis (primarily offender profiling). The primary objective of this qualitative review is to identify the extent of empirical evaluations of the effectiveness of a GIS. Although there is some research reference offender profiling, results are mixed. Only two empirical evaluations have been published that examine crime mapping, and both are limited to effects on perceptions. No empirical work links GIS to police deployment effectiveness.

INTRODUCTION

Geographic information systems (GIS) are now routinely employed by police agencies, particularly large urban jurisdictions. Extensive use of modern GIS technology in policing occurred mainly after the early 1990s, when computer resources and supporting software became more powerful, and, just as important, easy to use for police agencies (Harries, 1999; Weisburd & McEwen, 1997). Since the mid-

1990s the acceptance and use of a GIS for the analysis of crime patterns, the allocation of resources, focused deployment, and strategic planning has grown geometrically. Large cities such as Chicago, Charlotte/Mecklenburg, and New York are equipped with sophisticated GIS systems, tightly integrated into crime analysis and deployment programs (Getis et al., 2000). In addition, several regional centers have been created to facilitate the application of geospatial crime analysis, such as the Baltimore County Police Department's Regional Crime Analysis GIS (RCAGIS), San Diego's Automated Regional Justice Information System (ARJIS) (La Vigne & Wartell, 2001), and the Delaware real-time crime reporting system (Leipnik & Albert, 2003).

In 1997 a National Institute of Justice (NIJ) survey on the use of a GIS in law enforcement showed 36% of departments with 100 or more officers using computerized crime mapping (Mamalian & LaVigne, 1999). By 2001, 62% of departments with 100 or more officers had adopted some form of GIS (Weisburd & Lum, 2005). Successful implementation of a GIS have been reported in police departments such as Lincoln, Nebraska (Casady, 2003), Knoxville, Tennessee (Hubbs, 2003), Phoenix, Arizona (Hill, 2003), and Spokane, Washington (Leipnik et al., 2003). Collectively in these reports GIS technology is credited with reducing reported crime, depressing residential burglaries, tracking parolees and serious habitual offenders, and identifying hot spots (geographically concentrated crime).

Although GIS has been said to be an efficient and effective technology in policing, limited empirical assessment has been conducted. A primary reason relates to the multiplicity of functions of a GIS. Garson and Vann (2001) identified 21 functions, including pin mapping of crime locations, identifying hot spots, depicting crime density, creating briefing maps, etc. At the same time, the diversity of the applications of a GIS also inflates expected outcomes. While use typically focuses on crime reduction, GIS is also employed for resource allocation, managerial accountability, community relationships, and criminal investigation. Multiplicity of functions, variations of adaptation, and diversity of outputs in different law enforcement agencies make the specification and measurement of a GIS effect very difficult.

Nevertheless, some empirical analyses of GIS-related programs have been conducted, some within the United States, others elsewhere. Examples include studies examining the contribution of "real-time" crime analysis (Compstat) to crime reduction (Chilvers & Weatherburn, 2004; Eck & Maguire, 2000; Mazerolle, Rombouts, & McBroom, 2006), the effects of GIS assisted hot spots policing on crime (Sherman & Weisburd, 1995; Weisburd & Green, 1995; Braga et al., 1999), the impact of crime maps on citizens' perception of crime (Groff et al., 2005; Paulsen, 2004), and the effects of geographic-enhanced offender profiling on criminal investigation (Canter et al., 2000; Rossmo, 1995, 2001).

Despite these evaluative efforts, empirical assessment of GIS effect in policing does not exist. The primary objective of this qualitative review is to identify the empirical evaluations of the effectiveness of a GIS addressing the four major applications in policing: computerized crime mapping/crime analysis, hot spots deployment, improving command-level decision making, and offender profiling. Secondarily, we attempt to characterize from a policy perspective the current empirical research status, and assess the summative effectiveness of GIS applications in policing. Findings are intended to help guide research intended to optimize GIS technology applications to law enforcement.

MAJOR CATEGORIES OF GIS APPLICATION IN POLICE ORGANIZATIONS

A preliminary examination of functions and a review of the literature suggests four major applications of a GIS in policing: computerized crime mapping/crime analysis; hot spots deployment; improving

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