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Analysis of Factors Influencing the Adoption of Artificial Intelligence for Crime Management

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Abstract. Despite the benefits of Artificial Intelligence (AI) and its potential to produce deep insights and predictions, its adoption and usage are still limited in the area of crime management. Over the years, crime rates have been increasing in India, and law enforcement agencies face enormous challenges given the increasing population, urbanization, limited resources, and ineffective conventional models of reactive and investigative policing. There is an unprecedented opportunity for AI to be leveraged together with new policing models such as intelligence-led policing and predictive policing for effective crime management. In this research-in-progress paper, we offer a deeper understanding of factors significant for the adoption intention of AI for crime management in India. Further, on the practical front, the study will help law enforcement agencies to effectively leverage AI and implement innovative policing models for crime management.

Keywords: Artificial Intelligence, Crime management, AI Adoption

1 Introduction

Law enforcement agencies (LEA) in India are facing tremendous challenges in crime management due to several factors such as increasing crime rates, low police per person ratio, increasing population, and ineffective models of policing. The nature and methods of committing crimes are also changing rapidly, posing serious challenges to law enforcement agencies and other stakeholders of the criminal justice system in India.

The models of reactive, investigative policing are not enough to contain the increase in crimes. There is a compelling opportunity for implementing new policing models such as Intelligence-led policing (ILP) and Predictive policing to be more effective with limited resources. For example, there are vast volumes of data that are being collected internally that could be used for crime analysis and to influence police decision making. Predictive policing aims to rely on computer algorithms to see patterns, predict the occurrence of future events based on large quantities of data and aims to carefully target police presence to the necessary minimum to achieve desired results (Sanders and Sheptycki, 2017). The main objective of Intelligence-led policing is to apply crime data analysis to objectively inform policy, policing strategies, and tactical operations to reduce and prevent crime emphasizing the proactive use of police resources (Ratcliffe,

2016). However, such approaches are not easy to implement using manual processes and existing infrastructure.

There is growing interest in using digital technologies to address the challenges faced by law enforcement agencies in India. The use of data to detect crimes has long been a central feature in the security policies' decision-making process (Peeters and Schuilenburg, 2018). The fast availability of data has brought AI closer to commercial use (Kruse et al, 2019). AI integrated with other technologies such as Machine learning, Big data, Geospatial technologies could bring out innovativeness to the approach of solving problems in crime management and contribute to a safer environment. While there is growing interest in exploiting the potential of AI, several challenges in adoption have been reported, such as unclear relative advantage, issues in technology readiness, disconnect between strategies and automation, and regulatory support.

To the best of our knowledge, there is no empirical study done to understand the factors critical for the adoption intention of AI for crime management. To fill this research gap, we intend to use Technology-Organization-Environment (TOE) framework (Tornatzky and Fleischer, 1990) as the comprehensive theoretical lens along with other relevant theories such as Diffusion of Innovation (Rogers 2003), Routine Activity Theory (Fernando, 2014) and Near repeat phenomenon (Bowers & Johnson, 2005). We seek to explore the key factors that influence the adoption intention of AI in crime management. Our primary research question is:

RQ: What are the key factors that influence AI adoption intention by Law enforcement agencies for effective Crime management in India.

2 Theoretical Background

2.1 Adoption Theories

TOE framework has emerged as a valuable theoretical lens for understanding technology adoption. Diffusion of Innovation theory can explain intra-firm innovation diffusion (Hsu et al, 2006). TOE is also not limited by industry and company size (Wen and Chen, 2010). TOE has been applied successfully as key contextual elements that determine new IT adoption at the Organization level (Baker, 2012). Moreover, the TOE framework has been used for the adoption of technologies such as Customer-based IOS, Open Systems, EDI, RFID, Enterprise systems, and E-Business (Chandra and Kumar, 2018). We apply the TOE framework for understanding the facilitators of AI adoption in Crime management. On the other hand, Diffusion of Innovation theory (DOI) seeks to explain 'how, why, and at what rate new ideas and technology spread' (Rogers, 1995). Both of these theories are applied to understand the adoption intention of AI for Law enforcement agencies in India.

2.2 Crime management Theories

The potential to predict crime follows from the empirical observation that most crimes do not happen randomly, and often tend to be concentrated in time and space in so-called crime hotspots. Routine activity theory is, in short, an attempt to identify, at the

macro-level, criminal activities and their patterns through explanation of changes in crime rate trends (Fernando, 2014). Routine activity theory argues that three fundamental “almost-always” elements define criminal acts: a likely offender, a suitable target, and the absence of a capable guardian (Felson, 2002). So, to prevent crime – reduce the suitability of the victim, demotivate offenders, and improve guardianship. The near-repeat phenomenon states that if a location is the target of a crime such as a burglary, the homes within a relatively short distance have an increased chance of being burgled for a limited number of weeks (Jerry H. Ratcliffe and George F. Rengert, 2008). This pattern of space-time clustering has been referred to as the ‘near repeat’ phenomenon to reflect the association with repeat victimization. Policing strategies and models such as predictive policing and intelligence-led policing are based on these theories and are factored in building the research framework discussed.

3 Research framework and Hypotheses

In our study, the framework was operationalized using TOE framework, as depicted in Fig. 1 below. The rationale for the selection of the factors under each context for AI adoption is specified below.

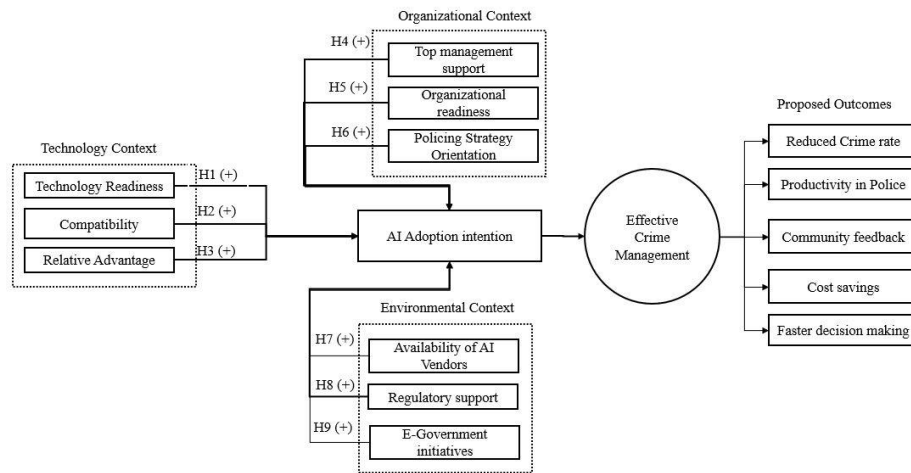


Fig. 1. Adoption of Artificial Intelligence for Crime management

3.1 Technology Readiness

Technology readiness is an important factor for adoption intention (Zhu et al, 2006). In the context of AI, technology readiness is tightly coupled with the availability of quality data, availability of AI-enhanced products and services for crime management, and readiness of infrastructure (Kruse et al, 2019). AI systems require a tremendous

amount of quality data for training the algorithms and for better predictability that needs to be deployed across the law enforcement agencies. Hence, we hypothesize,

H1: Technology readiness is positively impacted by LEA's intention to adopt AI for crime management

3.2 Compatibility

Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters (Rogers, 2003). Compatibility is an important determinant of innovation adoption (Oliveira et al, 2014). In the Indian crime management context, compatibility of AI applications with data sources, IT Infrastructure, and systems such as Crime and Criminal Tracking Network System (CCTNS) and National Intelligence Grid (NATGRID) is essential. Hence, we hypothesize,

H2: Compatibility is positively impacted by LEA's intention to adopt AI for crime management

3.3 Relative Advantage

Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes (Rogers, 2003). The perceived benefit of innovation has a significant effect on an organization's intention to adopt an innovative technology (Rogers, 2003). Prior research found that there is a positive relationship between the relative advantage of new technology and the acceptance of an innovation (Ifinedo, 2005; Yang et al, 2015; Kumar et al, 2016). AI allows an organization to reduce costs, increase efficiency, and amplify human intelligence (Curran and Purcel, 2017). Hence, we hypothesize,

H3: Relative advantage is positively impacted by LEA's intention to adopt AI for crime management

3.4 Top Management Support

Top management support refers to the engagement of a top-level leader for IS/IT implementations (Ifinedo, 2005). Applying AI for transformation is a strategic decision, and top management plays a critical role. Top management commitment can also have a significant positive influence on new technology adoption in terms of articulating a vision (Yang et al, 2015), providing capital funds (Hung et al, 2016) and allocating resources. Hence, we hypothesize,

H4: Top management support is positively impacted by LEA's intention to adopt AI for crime management.

3.5 Organizational Readiness

Organizational readiness refers to the extent to which organizational divisions are prepared to adopt new technology and implement organizational change. The barriers to AI adoption are not limited to the technical context, but also relate to the skills, organizational resources, processes, structures, and agility of the organization (Alsheibani et al, 2018). Hence, we hypothesize,

H5: Organizational readiness is positively impacted by LEA's intention to adopt AI for crime management

3.6 Policing Strategy Orientation

Policing strategies extend beyond conventional models of responding to calls for service and seek to increase crime prevention, intervention, and response effectiveness. The ability to forecast where and when the next crime or series of crimes take place (Uchida, 2014) has become of utmost importance to prevent crime from happening by effectively using new strategies such as Intelligence-led policing and Predictive policing. Greater emphasis on tackling criminals would be more effective than focusing on Crime (Ratcliffe, 2003). Hence, we hypothesize,

H6: Policing strategy orientation is positively impacted by LEA's intention to adopt AI for crime management

3.7 Availability of AI Vendors

AI vendors refer to the companies that possess the necessary knowledge, skills, and experience in AI technologies that offer products or solutions for the organizations seeking an opportunity to transform their business. Vendor partnership has been empirically supported as one of the critical determinants for innovation adoption (Ahmadi et al, 2015). If agencies know they can collaborate effectively with vendors, they are more likely to adopt the new technology (Huang and Palvia, 2001). Hence, we hypothesize,

H7: Availability of AI vendors positively impacts the adoption intention of AI by LEA for crime management

3.8 Regulatory Support

Regulatory support refers to the policies and regulations that encourage and accelerate the adoption of innovative systems at the organizational and community levels. Government regulatory issues are the main environmental factors that can affect new innovation adoption (Ifinedo, 2005; Yang et al, 2015). Governments need to put in place necessary data protection, ethical and legal frameworks to ensure that AI systems are developed and applied based on the values and citizen's fundamental rights. This leads to the following hypothesis:

H8: Supportive regulatory environment is positively impacted by LEA's intention to adopt AI for crime management

3.9 E-Government Initiatives

E-Government initiatives target increasing accessibility to the needed information, enhancing the efficiency of operations, facilitating collaboration, lowering maintenance and operating costs, and improving organizational (and inter-organizational) performance and productivity (Moore, 2009). Many governments across the world have since developed or in the process of developing National AI strategy and action plans, such as access to data through open platforms that will help drive the adoption of AI systems. This leads to the following hypothesis:

H9: Supportive e-Government initiatives are positively impacted with LEA's intention to adopt AI for crime management.

4 Proposed Methodology and Future Work

We will be using a survey methodology for testing the proposed hypotheses. Validated scales from existing literature will be adapted to the research context to formulate the questionnaire. To measure the items, we would use a 5-point Likert scale. Questionnaires so formulated would be distributed to middle and senior-level members of law enforcement agencies and relevant AI technology providers.

5 Expected Contribution

This Research-in-progress paper is expected to make three significant contributions. First, the validated model will help provide insights into how the adoption theories such as TOE and DOI could be extended in the context of AI adoption and crime management and set the direction for future research in this area. Second, this would help in formulating and updating AI policies and regulations. Third, on the practical front, the results of the study will be useful for law enforcement agencies to strategize and focus on factors and capabilities which will drive AI adoption, contributing to significant crime reduction and management.

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