

**REVIEW UPON ASIA & IRAN APPLYING OF INFORMATICS TECHNOLOGY & IOT IN AI'S VIEW****Abdollah Esmael Jahan Akbari<sup>1\*</sup>, Mahboubeh Mohammadi Nezhad**<sup>1\*</sup>Department of Governmental Management, Central Tehran Branch, Islamic Azad University, Tehran, Iran

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**Abstract**

AI is one of the key technologies which has greatly helped industrial processes and solved different problems in society. It is also a topic of discussion in many societies. Over time, the use of AI technologies has developed significantly in factories, health, banking and security as well as in e-commerce, the mass media, and mobile applied platforms. Despite these advancements, more and more variables are emerging, along with technological developments and solutions generated by artificial intelligence, in terms of how things are done and whether current resources are sufficient to meet people's changing needs. Thus, in conjunction with unresolved problems, the challenges are unsustainable and experts have not been sufficiently expert in completing their systems. This paper presents the main challenges in the development of artificial intelligence (AI) in Islamic Republic of Iran; after identifying the challenges by the subject analysis method and interview tool, the prioritization of these challenges and their relationship with fuzzy knowledge mapping is discussed. Data were collected from experts in the field of ICT particularly experts. In this research 36 pivotal challenges for AI development in Iran have been identified based on existing strategic documents and the thematic analysis method. Then, based on first impact matrix, Fuzzy Impact Matrix, Power Matrix, Impact Matrix, and Final Impact Matrix, FCMapper software and Pajek fuzzy cognitive mapping software were drawn. The results of research show that the five most important challenges in AI development in Iran include: lack of mechanism to increase AI market development, lack of necessary rules and legal regulations for AI, and lack of experts in AI-related fields and lack of Plans and Strategies. How governments provide for their citizens is evolving in the face of technological advancements like artificial intelligence (AI), the Internet of Things (IoT), and blockchain. To meet the needs of students in today's information age, public administration and public policy degree programs will need to update their curricula. This qualitative study looked at 84 master's degree programs in Asian public administration to assess the prevalence of IT education across the region. Based on our research, we can say that there was a wide range in both the availability of IT courses and the topics covered in them. Although IT courses were available in the vast majority of Asia's public administration degree programs, core classes and IT-specific specializations were significantly less common. Programs that teach kids about IT provide their strategies for doing so, which can be helpful to practitioners, teachers, researchers, and administrators.

**Keywords:** IRAN's AI; master's in public administration; IT; Asia; big data; e-government; AI; and other related terms

## Introduction

Nowadays, due to the spread of knowledge and making more complex and complex decision making, using information systems, especially AI systems, has become more important. It is clear that advanced and emerging technologies have had an undeniable role in the increasing development process of technological advances in all industries. Most countries that have succeeded in achieving superior technologies have been able to convert ideas and knowledge into best selling products by adopting appropriate policies and strategies. AI has had a tremendous impact on social, political, legal, social, security and business sectors of AI today, and will closely match human life in the not too distant future. AI is defined as the ability to process and convert data into information in order to targeted behavior. It is also defined as the rapid development of technology and the elimination of human-oriented organizations and companies, It will transform organizations and companies and activate innovation management in them (Parida & Gassmann Chen, 2021) Chen, this development is due to the multidisciplinary characteristics of artificial intelligence in different disciplines and fields of activities, since AI is an area of study, development and innovative, which is fed from different fields such as computer, machine engineering and other artifacts of human intelligence capabilities such as mental abilities, learning, comparative reliability, and decision-making capabilities in Lin 20. Policymakers still need to think about the views and expectations of AI societies and businesses in a prospective way so that they can make the decisions and policies that are appropriate. Because the decisions about technology, for the lives of millions of people, and for the competitiveness of millions of businesses, will have long-term consequences (Lauterbach, 2019).

The importance of AI is high in the present decade, so it is predicted to be about Two · percent of the world's gross output in 2030 will be raised from artificial intelligence. It should be noted that based on the economic situation of different countries, the degree of AI impact is also different. For example, it would be about 2°percent in GDP growth for the leading countries (U.S. and China) and about 8 percent for the poorer economies (Pakistan and Zimbabwe). Therefore, different countries have made extensive efforts to develop AI, and most of these efforts have usually been based on the challenges facing AI development (Rao & Verweij, 2017) Iran, like other countries, should also seek to develop a program for AI.

Therefore, it is necessary to identify and prioritize the challenges of AI development. In this regard, this study aims to answer this basic question regarding the specific characteristics of our country. What are the key challenges in AI development in the Islamic Republic of Iran? The challenges that would not be realized if there was no proper AI strategy for solving them. In this paper, along with identifying the challenges of AI development in Iran, the communication system between these challenges and their prioritization is discussed. In fact, in this research, we sought to order the final challenges. 3<sup>1</sup> challenges are challenges that are extracted from experts' viewpoints without any clear relation between them. Hence, this step seeks to identify the relationship between these challenges, using fuzzy cognitive approach. Fuzzy cognition mapping regularized the extracted factors and showed the relationship between the challenges. In fact, this process was accomplished on the basis of four previous impact matrices, Fuzzy Impact Matrix, Power Matrix of Effect and Ultimate Impact Matrix, FCMapper software, and Pajek software of fuzzy cognitive mapping.

Identifying the relationship between the challenges helps policymakers and decision-makers to know what other challenges might be if the challenge is resolved and whether or not this change and the changes that occur on other challenges are beneficial to the system. Once the relationship between the challenges is discovered, the fuzzy recognition mapping helps us determine the magnitude of these relationships and the effects and impacts of the challenges on one another.

The purpose of this study is to identify and prioritize the challenges of AI development to help the rulers and managers in the field of IT and AI, relying on financial variables and limitations, human resources, business, time and etc. The lack of artificial intelligence in this field is the main reason of this research. The challenges are most important and far more influential because different constraints do not allow all the challenges to be solved at the same time.

In the next section, the literature is studied. Then, the methodology of this study is presented. Then, the data analysis and the research findings are discussed in detail. The last section will discuss the conclusions and make future suggestions.

Numerous businesses are planning how they will implement technological solutions to boost internal effectiveness and customer service. Educating workers of the future across many industries in hard and soft digital skills is becoming increasingly important as the rate at which technology advances accelerates. This is especially important in the public sector, which has a hard time finding and keeping people with the necessary technological expertise. The public sector has a digital skills shortage that can be filled by academic institutions. Graduate degrees in public administration, such as the Master of Public Administration (MPA) or public policy (MPP), are increasingly seen as necessary for entry into the public and nonprofit sectors around the world. Therefore, they are crucial in preparing the next generation of public servants and policymakers, as well as leaders in the nonprofit sector. According to Koliba and Zia (2015), "it will be up to the field's Master of Public Administration (MPA) and Master of Public Policy (MPP) programs to provide this next generation with the tools needed to harness the wealth of data, information, and knowledge increasingly at the disposal of public administrators and policy analysts" (Koliba & Zia, 2015). According to Ni and Chen (2016), the failure rate of government IT projects can be lowered by emphasizing IT competencies in MPA and MPP programs. All personnel, not just IT specialists, must have adequate knowledge of information technology for an e-government initiative to be successful, according to Pavlichev (2004). When everyone in an organization has at least a foundational knowledge of technology, everyone benefits from improved collaboration and communication (Hunnius et al., 2015). The degree to which educational institutions are serving the practical needs of governments depends on whether or not they are providing a technology-focused education through such programs. Since their governments aggressively implement new technology and techniques, Asian countries and cities routinely rank highly in e-government and digital government polls (UN, 2018). However, it has been difficult for Asian universities to graduate IT-savvy employees (Khan et al., 2010). The research here measures how much of a priority information technology is in Asian MPA and MPP courses. According to previous studies (Manoharan and McQuiston, 2016; Mauldin, 2016), very few MPA and MPP programs in the United States include training in the use of information and communication technology. Similar tendencies were also

identified in other regions, but most of these reports only applied to one country. A number of Asian countries were chosen for this research to provide a regional perspective on how digital skills and competences are taught in graduate programs to current and future public administrators and politicians.

Managers in the public sector around the world are increasingly putting a premium on IT expertise in their new hires (Rose & Persson, 2012; Wheeland & Palus, 2010). Syllabi, mandatory and elective courses, and course descriptions from regional graduate public administration programs were analyzed for this study to shed light on what is deemed crucial for students in the field. The proportionate value of technological competencies was determined by analyzing courses from Asian public administration degrees. The extent to which these schools recognize IT education as a core competency for their alums was also evaluated.

The growing importance of digital tools only heightens the urgency of the need to train public sector workers to close the digital skills gap. Because of this need, schools are beginning to place more importance on courses that lead to jobs in public service and policymaking.

Even while public managers are typically dubious of the latest "game-changing" advances due to the prior failures of big IT projects, the public sector began adopting technology efforts long before the phrase "e-government" was even imagined. However, the exponential development of IT over the past decade and the rise of tech-savvy citizens have prompted some public managers to welcome digital technologies and advocate for the strategic use of IT in government operations. The government's adoption of IT has increased steadily during the past decade. "Such use includes, but is not limited to, social media (such as Twitter for emergency notification), 311 systems (which provide one-stop city information), mobile device apps (such as for traffic updates), data analytic tools for analyzing public service issues, and big data for predictive modeling of public service issues (such as crime and public health)" (Ni and Chen, 2016: 197). There has been a rise in the number of e-government and information technology-related electives offered by MPA and MPP programs in the United States. In fact, researchers have started looking into how to include IT skills into MPA and MPP programs (Ganapati & Reddick, 2016).

The use of IT has expanded across all branches of government. Schuppan (2010) argues for a more interdisciplinary approach in graduate programs, integrating IT and e-government into important public management topics, and he cites this as evidence that all employees, regardless of whether they directly apply IT to their functions or coordinate and oversee IT functions, need a basic understanding of e-government competencies. MPA and MPP programs, which are pivotal in many professionals' careers, might greatly benefit from incorporating the study and use of information technology and electronic governance. The theory-practice gap in public administration is pervasive across many areas, but is especially acute in the rapidly evolving spheres of information technology (IT) and electronic governance, both of which can benefit from educators' efforts to close the gap.

This article describes how obligatory and elective courses in Asian public administration degrees include topics related to information technology. In addition, this paper showcases leading examples of excellent IT education from regional MPA and MPP degree programs. In addition, the research team behind this effort will be able to gather course information with ease, paving the way for future academics to regularly collect course syllabi and examine the

evolution of MPA and MPP programs. In conclusion, the findings reported here may help teachers think of realistic approaches to work IT education into existing curriculum (Gulrajani & Moloney, 2012).

### **Theoretical foundations**

AI is a key to achieving stunning functional and operational change in most organizations today and it is also considered as one of the essential activities of commercial organizations. AI, which began as an academic discipline by McCarthy (2006) and was officially announced in Dartmouth Conference (1956), has attracted the attention of many organizations today. AI is a part of computers or computational science that produces expert systems, algorithms, and computer programs. The real purpose of AI is to mimic human brains and make decisions like humans in different situations and situations. NITI Aayog Some scientists suggest that AI is come to disrupt the world, and they say that AI is capable of carrying out high-level mental processes such as thinking, perception, learning, problem solving and decision-making, by way of today's advancements in data collection, analysis and computer processing power, opportunities for AI and enriching the way of life and work in the people's way have been altered since then. As a result of the development of AI, it will naturally cause the challenges which, if these challenges are managed, will lead to opportunity. If left, it will become a threat.

Some of the challenges, which are cultural, moral, psychological, and social challenges and are related to public trust are created when AI Engineer and Designer are not considered for achieving the purpose of product alignment and service of AI with humanity and social values. A class of challenges are created when AI is concerned with the relationship of AI with legal issues, human rights, rules of contract, law, and crime (Prec, Ozer & Hojnik, 2009).

#### **Study of the Literature**

The disconnect between public administration theory and practice has been the subject of extensive research. As a pracademic field, it is important to consider both academic and practitioner viewpoints (Box, 1999; Manoharan, 2016, O'Leary, and Vij, 2012; Raad-schelders et al., 1998). Due to the diverse backgrounds of MPA students, students from a diverse spectrum of academic backgrounds, who naturally anticipate exposure to both theoretical principles and applied methods. Stivers (2000), Newland (2000), Ospina and Dodge (2005), Raadschelders and Lee (2011), and many others note that many programs have not sufficiently integrated the practical knowledge needed for the public sector workspace.

In e-government, the chasm between theory and practice is even more pressing. There is a wide gap between the shallow training offered by most MPA and MPP programs and the extensive knowledge needed in the public sector workplace, according to studies. Such a gulf between theory and practice, as pointed out by Posner (2009), makes practitioners less eager to work with academic programs and participate in public affairs conferences.

This lack of interest among practitioners existed long before the widespread use of computers and the advent of e-government. Grizzle (1985) found a disconnect between what public administration degree programs were teaching and what employers wanted. This overarching claim is supported by subsequent research when applied to IT. Recent MPA graduates are not being hired to fill government agencies' information technology positions, according to a survey conducted by Christian and Davis (2016). Miller (2019) analyzed undergraduate public

administration programs and found that there was substantial variation in the curriculum and the skills taught to students among the member schools of the Network of Schools of Public Policy, Affairs, and Administration (NAS-PAA), the international accrediting body for public administration. Not all member institutions were adequately educating students for the workforce because NASPAA's standards were not consistently being implemented. However, the United States isn't alone when it comes to a lack of digital skills. According to research by Va'rallyai and Herdon (2013), the shortage of ICT experts in Europe may be traced back to the continent's inadequate educational offerings in the field. Similar problems are discussed by Khan et al. (2010) in the context of Asian universities. Even fewer young college grads have the skills necessary to plan, execute, and assess the government's use of IT (Bhuiyan, 2011; Dada, 2006). Governments in Asia have adopted e-government tools during the past decade, but they have had trouble making use of IT for public administration (Liu & Yuan, 2015). To stay up with the increasing usage of emerging technologies in public and nonprofit organizations, many authors have proposed that NASPAA should reemphasize IT and e-government in its accreditation criteria (Ganapati & Reddick, 2016; Manoharan and McQuiston, 2016; Shark, 2016). To this purpose, Manoharan and McQuiston (2016) developed a classification system for courses in public administration that focus on information and communication. They advocated for "demarcating courses with GIS, cybersecurity, social media, big data, cloud computing, crowdfunding, e-government, privacy and confidentiality, digital divide (accessibility), and infrastructure" (177). When the authors first compiled these IT tools, they provided a comprehensive overview of where the discussion of real-world public administration was at the time.

### **The Role of Cutting-Edge IT in Government**

Additional technology resources have been accepted for use in policy circles since the introduction of Manoharan and McQuiston's typology of IT education.

Emerging technologies have been leveraged by successful pilot initiatives at the municipal and state levels. Here are a few instances of cutting-edge innovation and how it has altered government operations or citizen participation. By incorporating these emerging technologies into the typology, researchers will be able to determine whether or not public administration curriculum reflects actual workforce needs.

The IoT refers to the network of interconnected physical objects that may exchange and process information over the internet (Gubbi et al., 2013; Zanella et al., 2014). The purpose of collecting stoplight data in both Chicago, Illinois, and Dublin, Ireland, is to offer real-time statistics on street use and congestion. In addition to providing real-time data to customers, smart electricity meters can also alert utilities about usage patterns and power disruptions (Kaman, 2017; Uribe-Pe'rez et al., 2016). Iteratively establishing administrative judgments in the public sector may also be possible using machine learning tools (Coglianese & Lehr, 2016). Maciejewski (2017) believes that machine learning might be used to automatically comb through huge amounts of information, which could help with the challenges of analyzing "big data." Predictions of employment and employability fluctuations have previously been made using machine learning (Garc'a-Penalvo et al., 2018). Possible uses of AI in government include predicting where crimes will occur in the future using demographic and economic data

(Kouziokas, 2017). According to Mikhaylov et al. (2018), in order to effectively integrate AI to better serve stakeholders and efficiently produce AI policy, government agencies and educational institutions must work together. According to Jacobs (2014), sophisticated artificial intelligence may allow robots to handle the thorny ethical dilemmas that arise in public administration. Public administration students will eventually be expected to utilize the technologies now accessible to local, county, and state agencies, as well as integrate cutting-edge tools into aging networks.

Neirotti et al. (2014), Niculescu and Wadhwa (2015), and Thuzar (2011) all report that countries in Asia are among the first to implement such innovations. This has occurred simultaneously as the study and practice of public administration have grown rapidly in the region. Public administration education and training in East Asian countries have been the subject of previous study, and there are established avenues for academic interaction between these countries and their Western equivalents. There has been a lot less research done on how widespread MPA and MPP programs are in other parts of Asia. Park and Park (2006) examined undergraduate public management programs in South Korea, and Walker et al. (2013) found cultural disparities in how students there see public ownership. Public administration education in Asia is rarely the subject of in-depth research or description in academic literature. Concerns for public policy programs in East Asia include a lack of locally-relevant courses, a lack of emphasis on policy analysis, and a shortage of faculty with the necessary qualifications. Implementing e-government projects (Bhuiyan, 2011; Ramli, 2012; Singh et al., 2010); coordinating best practices for e-government portals (Yuan et al., 2012); or the intersection of technology and public administration in Asia are common themes in the few studies that address this topic.

Strielkowski et al. (2017) highlight the need of incorporating ICT into voter registration and election processes.

This study catalogs the information technology competencies emphasized by Eastern Asian public administration curricula and determines whether or not these competencies are required for graduation. This research gives guidance for institutions who want to help students enter the workforce by discussing similarities and differences across programs in Asian countries and across the region.

### **Methodology**

The researchers created a directory of master's in public administration and master's in public policy institutions in east Asia. Search engine inquiries, nation listings on platforms like MastersPortal and AdmissionTestPortal, and Wikipedia pages were used to compile a comprehensive list of public administration programs around Asia. After compiling a preliminary list of schools offering public administration degrees, analysts viewed each institution's website to learn more about its offerings. We gathered information on the types of public administration and public policy degrees available, the types of specializations available to students, and the types of information technology (IT) coursework required for degree completion. Secondary sources such as course catalogs, prospective student literature, online curricula, graduate handbooks, class checklists, and semester calendars were combed through to compile data on each school's public administration program(s). Course requirements could be found in supplementary materials given by the respective country's education department or

comparable entity.

After gathering relevant information regarding each program's webpages and compulsory courses, an email was sent to each department chair, asking what kind of information technology courses were offered, whether they were required or elective, and how often they were offered. Researchers located a contact via social media sites (e.g., ResearchGate, LinkedIn) or over the phone when an e-mail address for a department was absent or wrongly transcribed. One month after the first effort, a second round of e-mail correspondence began, and two months after that round ended, a final batch of e-mails was sent to the remaining universities. The presence or absence of an IT-focused degree program and the status of IT-related courses as either obligatory (core) or elective (elective) were also recorded. Using a typology modified from Manoharan and McQuiston (2016), we examined course titles and descriptions for IT content.

### Coding a Course

Courses having IT content were found through a review of relevant course materials like syllabi, graduate handbooks, degree plans, course outlines, department bulletins, and course descriptions covering a wide range of ICTs. The authors have compiled a list (Table 1) of the topics they believe should be covered in graduate-level public administration programs.

**Table 1.** information technologies.

Artificial Intelligence Government/governance	E-
Big Data	GIS
Blockchain	IT infrastructure
Cloud Computing	Machine learning
Crowdfunding/crowdsourcing	Privacy
Cybersecurity	<a href="#">Social media</a>
Digital Divide accessibility	User

### Results

We reached out to 84 graduate schools of public administration across Asia. There are no Master of Public Administration (or equivalent) degree programs available at schools in East Timor or Laos. There was only one university in many of the Asian countries considered for this study (Bhutan, Brunei, Indonesia, Mongolia, and Myanmar). There were typically two or more schools per country offering master's degrees in public administration.

Eight of the included programs lacked information about their IT curriculum. Thirty-one percent of the schools polled did not have any classes or electives devoted to IT at all, and 26 of those schools. Three program directors who said their departments lacked an IT course said they were contemplating adding one. Fifty Master of Public Administration and Master of Public Policy degrees included technological instruction. Thirty-eight out of forty-one departments that provided IT courses in public administration included at least one ICT-based course. Twelve programs (or 24% of all programs) surveyed offered more than one IT-related course.



In this study, 80 different courses were examined that had some kind of ICT component. Only a few of public administration degree programs have made IT literacy a priority in their curricula. There was a significant lack of information technology education for public administration graduate students at all but seven colleges. Departments of public administration throughout the rest of Asia typically provided electives covering a wide range of information technology skills. Data analytics, e-government in the regional context, big data, ICT behavior, public management information systems, and computer applications in public administration are all examples of such elective courses.

The State Education Commission of China takes a fresh approach to public administration by designing MPA programs for China's institutions. Information Technology and Application is a mandatory course for students to take in order to graduate (Ye, 2016). Each school decides which electives to provide. E-Government in China is one course that students at Fudan University in Shanghai can pursue, while students at Tsinghua University in Beijing can enroll in the Technology Innovation and Entrepreneurship program. Chinese institutions have not linked GIS coursework with the MPA curriculum to any significant degree (Ye, 2016: 50), even though such courses are ubiquitous in American public administration programs.<sup>1</sup>

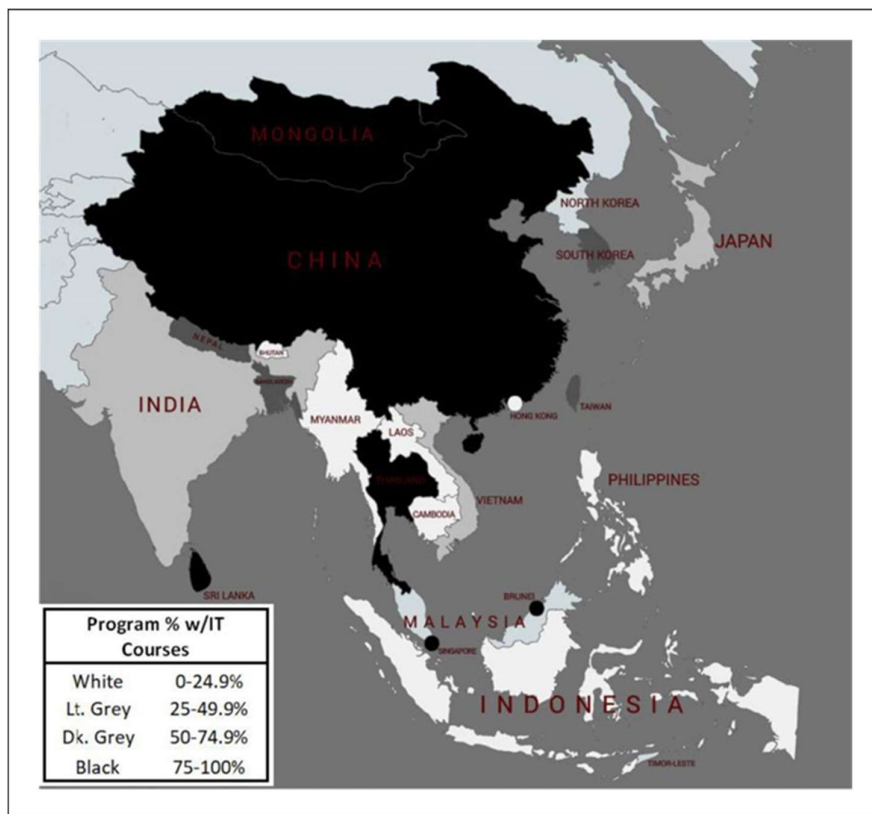


Figure 1. Percentage of public administration programs with IT coursework, by country.

The locations of public administration schools in Asia are shown in Figure 1. Higher education institutions in a country that provide public administration degrees with an emphasis on information technology are depicted with darker colors. The majority of the institutions in several of the nations studied (Brunei, China, Mongolia, Singapore, Sri Lanka, and Thailand)

offered some sort of IT instruction as part of their public administration programs.

Each institution in Sri Lanka and Singapore offering a master's degree in public administration also offered a specialization in information technology. One hundred percent of the population in Brunei, Mongolia, and Thailand have access to an IT course through an MPA or MPP program. Public administration programs in both China (16 of 18 or 89%) and South Korea (5 of 9 or 55%) offered at least one IT-related course.

In Bangladesh, Nepal, and Taiwan, we found that 50% of MPA/MPP programs included some sort of IT education. Fewer possibilities were available to public administration master's students in other countries, including India (9 of 20 programs, 45%) and Vietnam (1 of 3).

programs; 33% are produced in India; 20% in Japan; 25% in Malaysia; and 13% are produced in Japan. In Bhutan, Indonesia, Laos, and Myanmar (Burma), just one university offered a master's degree in public administration; this university did not offer any information technology courses. There were no IT-related electives available at either of Cambodia's two MPA schools.

Many Asian universities that award MPA degrees also provide IT-related courses. In fact, the statistics show that the vast majority of PA schools in Asia include electives in the field of information technology. However, courses in ICT that go beyond a basic introduction have not traditionally been offered by these departments. Although several of the programs included in this study offered IT survey courses, those that provided advanced ICT seminars on a consistent basis were uncommon. A small percentage of the programs examined in this research mandate IT-related coursework for MPA and MPP degrees.

Thesis papers and concentrations are two viable alternatives to mandatory IT courses.

To a larger extent than departments offering a single IT-themed course, students in the public administration program at Dr. Babasaheb Ambedkar Marathwada University (Aurangabad, India) are immersed in information technology instruction. "Computer Application in Public Administration" is an available elective for students in the program. Two required courses, Modern Administrative Theory and Recent Issues in Indian Administration, require students to prepare IT-focused papers as part of the degree requirements. Adopting IT-themed research projects in mandatory courses satisfies the need for IT skills education without compromising on other areas in the intended course of study for a program attempting to accommodate extra coursework into an existing rotation.

Information technology (IT) concentrations and master's degrees in public administration are uncommon in Asia. A policy track at Chiang Mai University's (Thailand) School of Public Policy, a specialized degree at University of Sri Jayewardenepura (Sri Lanka), and the Spatial Information Management (SIM) specialization at the University of the Philippines' National College of Public Administration and Governance (UP-NCPAG) were identified as possible "best practices" in this research.

There is a "Digital and Governance Policy Track" available to students in the Master of Public Policy degree program at Chiang Mai University. Five IT-related courses are required for this concentration. E-governance, digital society and governance (IoT, Smart City, and privacy), intellectual property management, social media and public policy, and ICT literacy for policy makers were all obligatory courses that students had to take before receiving their diplomas.

Students in the Master of Public Administration in e-Government (MPAE) program at the University of Sri Jayewardenepura were required to take seminars on "ICT Organization and Knowledge Management," "Social Media and e-Government," "Information Management," "Human Resource Information System Management," and "Information Security" (Postgraduate Institute of Management, 2019). Cybersecurity, the regulation of e-government services, and electronic commerce are just a few of the available IT-related electives for MPAE students.

The University of Pennsylvania's (UP) NCPAG's SIM concentration is centered on the intersection of spatial information literacy and sound policymaking. The SIM program hopes to foster a community of skilled individuals as another of its outcomes. Information Technology (IT) is the topic of three courses: Information and Data Flow Analysis I and II, as well as Spatial Information Management for Public Administrators. Technology-based simulations were also incorporated into the Management Planning and Control curriculum.

### **Prominent Examples**

Two of the courses highlighted by this study call for significant student participation using information technologies. Both frameworks can be used as a starting point for developing one's own information technology and public administration curriculum at the graduate level.

### **Example A: Singapore's National University**

A Master of Public Administration degree can be earned in just one year at Singapore's National University. There is a substantial quantity of IT material covered in four of the program's elective courses. Students receive an introduction to technological resources in a survey course titled Public Administration, Technology, and Innovation. Students enrolled in Big Data, Official Statistics, and Public Policy will learn the fundamentals of designing data collection and analysis programs. In addition to learning how to utilize GIS, students learn to recognize and address common concerns such as data privacy and responsible data use.

The focus of the course National Science and Technology Policy is on the student's future career. The best policies are determined through case studies, with an emphasis on the experiences of Asian countries. Modules on crowdsourcing, blockchain, and autonomous systems are only some of the technologies covered in Governing Cities of Tomorrow. Students can learn the fundamentals of a variety of IT fields or zero in on a particular set of skills.

### **Panjab University, Case B**

Suri and Kaur (2013) polled professors at Panjab University in Chandigarh, India, to find out how far along the path to e-governance their institution has progressed. One major source of worry has been pinpointed: a lack of training. The university recognized this problem and revised its Master of Public Administration curriculum to include an Information and Communication Technology and Public Administration course. The department occasionally offers an additional (optional) course called "E-Governance." In doing so, it helps students develop the skills they'll need to solve typical issues raised by policy stakeholders once they've entered the workforce.

Panjab University's Master of Public Administration program provides students with the opportunity to focus their studies on either Applied Development Administration, Economic

Administration, or Human Resource Management. Students in these concentrations were given the option of writing a paper on "Information Technology and Computer Applications in Public Administration," which is designed to equip them to do the following:

have a firm grasp on the technological and human resource input necessary to create secure and ethically sound management information systems, e-governance applications, and organizational frameworks (Panjab University, 2018).

Students who wish to graduate with an Administrative Technology concentration are required to write the paper. In order to guarantee that students who want a more technology-focused education will obtain it, it is important to promote competence in information technologies through both obligatory and elective coursework.

### **For Use in Future Studies**

All public administration research could benefit from the findings offered in this study. Research of the availability and quantity of IT courses within MPA and MPP programmes should be extended to a wider geographical area in future studies. Articles in the future should also attempt to assess whether or not the availability of IT courses has changed over time. It is recommended to get in touch with countries in the CIS (Commonwealth of Independent States) to find out how advanced the IT education is in MPA and MPP programs across Asia. However, a content analysis of syllabi would enable researchers to determine the precise themes and proportion of each class dealing with each sort of information technology, but in this study, only course titles and descriptions were assessed for the presence of IT coursework. Syllabi from two parts of the same course taught by different faculty could be compared in order to examine the role of the instructor in these types of classrooms.

Degree completion diplomas. Extending the scope of the study beyond MPA and MPP degrees is another promising direction for the development of new knowledge in this area. Several Indian graduate institutes provide 1-year public affairs certifications that do not lead to a Master of Science diploma. The Indian Institute of Public Administration in New Delhi and the Management Development Institute in Gurgaon do not include information technology courses as part of their graduate certificates in public administration, but the Tak-shashila Institution in Bangalore's Graduate Certificate in Technology and Policy does. The Advanced Management Programme in Public Policy (AMPPP) at the Indian School of Business (Hyderabad) is split into four 10-day blocks. Completion of the program does not result in a Master's degree, but students are expected to participate in a number of workshops centered on information technology. Participants in the AMPPP class of 2019-2020 were required to attend workshops on topics like data analysis basics and the use of big data in government. It's possible that in-depth analysis of these graduate certificates will show a set of compulsory classes that are different from what's typically offered in MPA and MPP programs.

Technology and public administration training in developing countries. Researchers could examine if public administration schools in less developed parts of the world take a similar approach to the teaching of IT as universities in Asia. School and department chairs in other parts of the global south could provide an ICT concentration, an MPA with an e-government concentration, or another of the other models discussed in this study.

Analysis throughout time spans. In order to determine whether MPA and MPP programs are increasing, maintaining, or irregularly offering students classes addressing information technology competencies, researchers need to collect longitudinal data from each program through regular contact with department heads. Quantitative statistics showing the relative importance of each type of IT used by departments over time would be helpful. Both researchers and professionals could benefit from an analysis of how different sections of the course or different academic terms cover different technologies taught by the same professor. Finding out if there is a mismatch between what is being taught and what is desired in new hires can be determined by conducting interviews with local employers in the countries where these programs are implemented.

### **Conclusion**

The purpose of this research was to assess the availability of IT education in MPA and MPP degree programs across Asia. The availability and popularity of IT classes in Asian public administration degree-granting schools was fairly low, while programs like Chiang Mai University's Master of Public Policy incorporate IT classes to a large degree. Programs in public administration across Asia typically incorporate some study of IT. Students participating in MPA and MPP programs in South Korea and India were exposed to more information technology-related coursework than their counterparts in MPA and MPP programs in Cambodia, Indonesia, Laos, and the Philippines.

In Asia, graduate public policy programs rarely offered courses that delved deeper into ICT than their basic or overview level. There were indeed some advanced IT courses available as electives in some Asian public administration degree programs. A handful of regional department heads have seriously studied the idea of expanding access to IT courses at area schools. However, it is challenging to add more curriculum to the requirements because Master's level public administration programs only last for 1 or 2 years. Bangladesh's North South University tried something new by having its students participate in a computer skills class for no academic credit. However, the vast majority of the schools considered here required students to make their own arrangements to take computer technology classes at times that worked with their schedules.

Educators in the area might work together to solve the problem of maintaining a consistent IT curriculum in their graduate public administration programs. According to Shark (2016), increased oversight by a specialized institution could help close the skills gap between public administration programs and the profession. An Asia-wide public administration association, such as the Asian Association of Public Administration (AAPA) or the Eastern Regional Organization of Public Administration (EROPA), might establish a technological leadership section. These groups might create and supply a leadership program that find the leading degree-granting institutions in Asia and teach their methods. Universities with full degree plans that wish to teach some IT skills to their students may find retreats and short-duration courses an acceptable alternative.

All throughout the world, businesses and governments are taking use of new technologies. However, most Asian schools of public administration provide scant instruction in this rapidly expanding discipline. Chairs of public administration programs should include coursework, if

not essential lectures, that will help students flourish in today's increasingly technology-driven environment in order to better prepare their students for the workforce.

When it comes to closing the skills gap between what is taught in public administration programs and what is needed in the profession, the scenarios covered in this paper can help guide teachers, department chairs, students, and public practitioners in the right direction. The results presented here are useful for public service education programs all across the world.

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