Research on the Impact of Artificial Intelligence on Government Public Service Quality
Take Hangzhou as an Example

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Abstract. With the in-depth development of "promoting the modernization of national governance system and governance capacity", governments at all levels try to use artificial intelligence technology to improve the quality of government public services, which has attracted the attention of all sectors of society. This paper selects Hangzhou City, which combines artificial intelligence with government service platform, as a research case, uses EViews software to empirically analyze the relevant data, and obtains the correlation between artificial intelligence technology and government public service quality, such as public education, social security, science and technology, culture, sports and media, health care and family planning, agriculture, forestry and water. Through the analysis, this paper puts forward some suggestions for the application of artificial intelligence to government service.

Keywords: artificial intelligence · public service quality · regression analysis

1 Introduction

Artificial intelligence (AI) is a new technical science that studies and develops theories, methods, technologies and application systems used to simulate, extend and expand human intelligence [1]. The government of China attaches great importance to the combination of artificial intelligence technology and government public services, because improving the government's public service capacity is an important factor in realizing the modernization of the national governance system and governance capacity. Based on this, the state has formulated a series of policies. For example, in 2017 the plan for the development of a new generation of artificial intelligence issued by the State Council, it is mentioned to focus on education, medical treatment Pension and other urgent livelihood needs, accelerate the innovative application of artificial intelligence, and provide personalized, diversified and high-quality services to the public [2]. In 2018, the key points of government affairs publicity released by the State Council, it is mentioned to strengthen the application of the new generation of artificial intelligence in the government service platform and improve the efficiency of government services [3]. In 2019, the

Fourth Plenary Session of the 19th CPC Central Committee was mentioned to improve the public service system and promote the equalization and accessibility of basic public services. Establish and improve the system and rules for administrative management by using the Internet, big data, artificial intelligence and other technical means [4]. In 2020, the Fifth Plenary Session of the 19th CPC Central Committee further mentioned the need to "strengthen the construction of digital society and digital government and improve public services" [5]. This paper uses linear regression to empirically analyze the relationship between artificial intelligence technology and government public service quality, and further puts forward development suggestions.

2   Variable Selection and Analysis

2.1   Independent Variables and Analysis

By consulting the national basic public service standard (2021 Edition) and lots of documents, combined with the actual situation of Hangzhou and the availability of data, this paper divides the dimensions of measuring the quality of public affairs into the following six aspects: Public Education (PE), science and Technology (ST), culture, sports and media (CPM), social security and employment (SE), health care and family planning (MH) Agricultural and forestry water (AFW). In China, the quality of public service is closely related to the financial support behind it. The level of government financial expenditure on public service is highly related to the level of public service supply, so the measurement index of each aspect is the corresponding amount of public financial expenditure.

The data of Hangzhou municipal government's expenditure on public education, science and technology, culture, sports and media, social security and employment, health care and family planning, agriculture, forestry and water from 2010 to 2020 are counted in Excel and imported into EViews software for data analysis. The change trend of each variable in Fig. 1 is obtained, in which the abscissa is the year, The ordinate is the amount of financial expenditure (unit: 100 million yuan). During 2010–2020, the growth rate of public education expenditure is 67%, the growth rate of science and technology is 49.4%, the growth rate of social security and employment is 69.8%, the growth rate of health care and family planning is 55.9%, and the growth rate of agriculture, forestry and water is 74%. In recent ten years, the overall trend of Hangzhou municipal government's public service expenditure in these six aspects has been increasing, but the science and technology expenditure has decreased significantly in 2020, because the government's expenditure on the national science and culture literacy improvement project has decreased, and the expenditure on agriculture, forestry and water has fluctuated slightly for two consecutive years in 2017 and 2018. The reason is that the department implemented strict economy and reduced administrative operation expenditure, and the expenditure on water conservancy projects and farmland water conservancy construction projects was lower than expected. The expenditure on health care and family planning decreased slightly in 2018. The reason is that the subsidy funds given by the superior government decreased. In order to ensure the rationality of the analysis, the year 2020 with obvious decline is excluded.
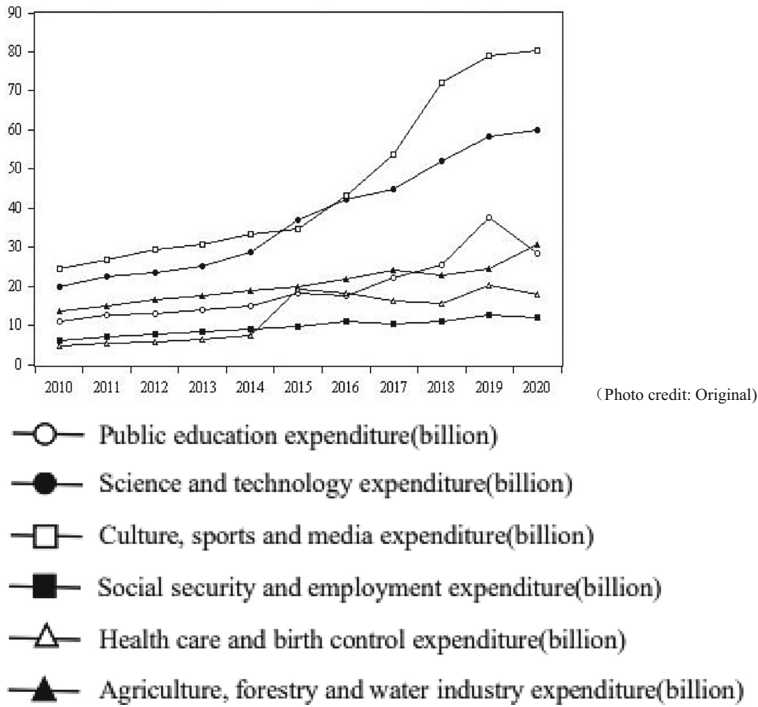
（Photo credit: Original)

—O— Public education expenditure(billion)

—●— Science and technology expenditure(billion)

—□— Culture, sports and media expenditure(billion)

—■— Social security and employment expenditure(billion)

—△— Health care and birth control expenditure(billion)

—▲— Agriculture, forestry and water industry expenditure(billion)

Fig. 1. Change trend of each independent variable

2.2 Dependent Variable and Analysis

Hangzhou is the leader in the field of AI in China. It attaches great importance to the development of AI. Therefore, many AI enterprises have emerged, including not only the high technology industry but also the people's livelihood, such as intelligent education, intelligent agriculture, science and technology, Internet plus medical care, etc. This paper measures the development of artificial intelligence technology in this region by the number of artificial intelligence enterprises (NB), because the number of artificial intelligence enterprises can well reflect the overall summary of the development of local artificial intelligence technology.

The statistics of the number of artificial intelligence enterprises established in Hangzhou from 2010 to 2020 are put into Excel software and imported into EViews software for data analysis, as shown in Fig. 2. The abscissa is the year, and the ordinate is the total number of artificial intelligence enterprises (unit: PCS). In recent ten years, the number of artificial intelligence enterprises has increased year by year. Among them, 2015 is the boom period of newly registered artificial intelligence enterprises. This is because the Hangzhou municipal government proposed to adopt the economic development model based on artificial intelligence in the "No. 1 project" [6] in 2014. In 2015, it further proposed to accelerate the technological development and industrialization of artificial intelligence Strengthen the construction of artificial intelligence public
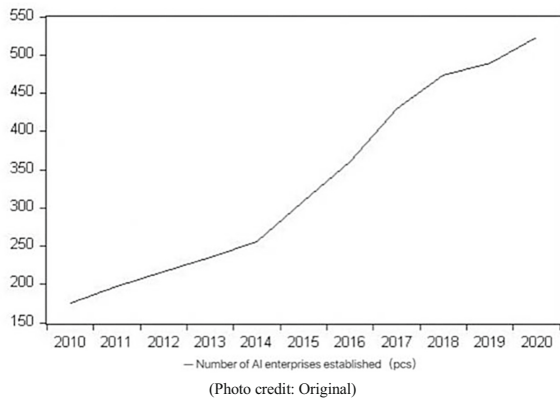
(Photo credit: Original)

Fig. 2. Trend chart of the number of artificial intelligence enterprises established

service platform. From 2015 to 2020, Hangzhou has successively issued many policies to promote the development of artificial intelligence. All 267 enterprises have been registered and established in the past six years, accounting for 51% of the total. Since the independent variable in 2020 is excluded, the dependent variable in 2020 is also excluded.

2.3 Control Variable

Economic level (GDP), measured by per capita regional GDP; The total population (PT) is measured by the population at the end of each year. The quality of administrative personnel (PF) is expressed by the statistical score of "good and bad comments" of local governments.

3 Model Building and Basic Assumptions

This paper looks up the Hangzhou statistical yearbook 2010–2020, the official website of Hangzhou Finance Bureau, Hangzhou Science and technology and various public data.

3.1 Model Construction

In order to eliminate the influence of interactive items and other factors, reveal the relationship between digital technology and public service level, add control factors and build a first-order linear model:

$$PE_{ti} = \beta 0 + \alpha 1NBti + \alpha 2GDPti + \alpha 3PSti + \alpha 4PQti + \Delta ti \tag{1}$$

$$ST_{ti} = \beta 0 + \alpha 1NBti + \alpha 2GDPti + \alpha 3PSti + \alpha 4PQti + \Delta ti \tag{2}$$

$$CPM_{ti} = \beta0 + \alpha1NBti + \alpha2GDPti + \alpha3PSti + \alpha4PQti + \Delta ti \qquad (3)$$

$$SE_{ti} = \beta0 + \alpha1NBti + \alpha2GDPti + \alpha3PSti + \alpha4PQti + \Delta ti \qquad (4)$$

$$MH_{ti} = \beta0 + \alpha1NBti + \alpha2GDPti + \alpha3PSti + \alpha4PQti + \Delta ti \qquad (5)$$

$$AFW_{ti} = \beta0 + \alpha1NBti + \alpha3GDPti + \alpha4PSti + \alpha5PQti + \Delta ti \qquad (6)$$

where: PEti represents the public education capacity of city I (I = 1, 2,…, n) in year t, ST_{ti} represents the science and technology capacity of city I in year t, CPM_{ti} represents the culture, sports and media capacity of city I in year t, SE_{ti} represents the social security and employment level of city I in year t, and MH_{ti} represents the medical, health and family planning level of city I in year t, AFW_{ti} represents the agricultural and forest development capacity of city I in year t, the number of artificial intelligence enterprises established in city I in year t, GDP_{ti} represents the economic development level of city I in year t, $PSti$ represents the size of population of city I in year t, and PQ_{ti} represents the quality level of government personnel in city I in year t, Δti which is a random disturbance item.

3.2 Basic Assumptions

G1: the number of artificial intelligence enterprises (NB) is positively correlated with public education (PE)

G2: the number of artificial intelligence enterprises (NB) is positively correlated with science and Technology (ST)

G3: the number of artificial intelligence enterprises (NB) is positively correlated with culture, sports and media (CPM)

G4: the number of artificial intelligence enterprises (NB) and social security are positively correlated with employment (SE)

G5: the number of artificial intelligence enterprises (NB) is positively correlated with health care and family planning (MH)

G6: the number of artificial intelligence enterprises (NB) is positively correlated with agriculture, forestry and water (AFW)

3.3 Research Methods

This paper looks up the Hangzhou statistical yearbook 2010–2020, the official website of Hangzhou Finance Bureau, Hangzhou Science and technology and various public data. Using Excel and EViews software, this paper makes an empirical analysis on the impact of artificial intelligence technology on the government's public service capacity and analyzes and discusses the relevant conclusions.

Table 1. First order linear regression analysis

Variable		Coefficient	Prob	R-squared	Adjusted R-squared
LNY1	X	0.114916	0.0000	0.983805	0.982005
	C1	−0.670630	0.7096		
LNY2	X	0.058327	0.0001	0.829820	0.810911
	C2	0.086702	0.9785		
LNY3	X	0.015777	0.0000	0.895157	0.883508
	C3	4.297343	0.0001		
LNY4	X	0.163927	0.0000	0.939252	0.932503
	C4	−8.479937	0.1197		
LNY5	X	0.037203	0.0000	0.898111	0.886790
	C5	8.107736	0.0004		
LNY6	X	0.042898	0.0009	0.722459	0.691621
	C6	−1.885176	0.5638		

4   Empirical Analysis

Make first-order linear regression analysis on independent variables and dependent variables by using models (1)–(6). Table 1 presents the coefficients of regression variables and basic statistics.

The final model is:

$$PE_{ti} = -0.670630 + 0.114916NBti \tag{7}$$

$$t_1 = 23.38201 \tag{8}$$

$$R_1^2 = 0.983805 \tag{9}$$

$$\overline{R_1^2} = 0.982005 \tag{10}$$

$$ST_{ti} = 0.086702 + 0.058327NBti \tag{11}$$

$$t_2 = 6.624588 \tag{12}$$

$$R_2^2 = 0.829820 \tag{13}$$

$$\overline{R_2^2} = 0.810911 \tag{14}$$

$$CPM_{ti} = 4.297343 + 0.015777NBti \tag{15}$$

$$t_3 = 8.765984 \tag{16}$$

$$R_3^2 = 0.895157 \tag{17}$$

$$\overline{R_3^2} = 0.883508 \tag{18}$$

$$SE_{ti} = -8.479937 + 0.163927NBti \tag{19}$$

$$t_4 = 11.79634 \tag{20}$$

$$R_1^2 = 0.939252 \tag{21}$$

$$\overline{R_1^2} = 0.932503 \tag{22}$$

$$MH_{ti} = 8.107736 + 0.037203NBti \tag{23}$$

$$t_5 = 8.906809 \tag{24}$$

$$R_1^2 = 0.898111 \tag{25}$$

$$\overline{R_1^2} = 0.886790 \tag{26}$$

$$AFW_{ti} = -1.885176 + 0.042898NBti \tag{27}$$

$$t_6 = 4.840215 \tag{28}$$

$$R_1^2 = 0.722459 \tag{29}$$

$$\overline{R_1^2} = 0.691621 \tag{30}$$

The economic significance of the model is obvious, that is, the number of artificial intelligence enterprises has a positive impact on public education expenditure, science and technology expenditure, culture, sports and media expenditure, social security and employment expenditure, medical and health and family planning expenditure, agriculture, forestry and water expenditure. Among them, the expenditure on public education, social security and employment has the most significant impact, so these two aspects will be described in detail below.

Specifically, the coefficient of LNY1 is the elasticity of public education expenditure, that is, when other variables remain unchanged, for every 1% increase in the number of artificial intelligence companies (NB), the expenditure on public education

will increase%, that is, the development of artificial intelligence is very conducive to improving the service quality of public education of Hangzhou municipal government. It is mainly reflected in the following two aspects. The first is to use artificial intelligence to improve the service capacity of public education. For example, the current use of the data cockpit of the urban brain and education system in Hangzhou relies on monitoring big data for scientific decision-making and efficient management, which simplifies the steps of freshmen enrollment, creates a one-stop online service, and improves the efficiency of campus epidemic intelligent control. The second is to use artificial intelligence technology to nurture the pillars of the country, but also promote the rapid development of artificial intelligence. For example, the AI education project in Yuhang District of Hangzhou is divided into intelligent teaching area and competition area. The large-scale artificial intelligence interactive project in the intelligent teaching area has inspired students' interest, and the colorful competition activities in the competition area have stimulated students' scientific and technological innovation ability.

The coefficient of LNY4 is the elasticity of social security and employment expenditure, that is, when other variables remain unchanged, for every 1% increase in the number of artificial intelligence companies, the expenditure on social security and employment will increase%, that is, the development of artificial intelligence is very helpful to improve the service quality of social security and employment of Hangzhou municipal government. In order to strengthen social security in the new era, Hangzhou has launched the reform of "social assistance community" to promote the high-quality development of social assistance, striving to show the "head goose style" of "important window" [7]. Its main workflow is to use cloud computing, big data, Internet of things and other technologies, first establish evaluation indicators, select rescue objects, then find appropriate rescue subjects, and finally rely on the rescue platform for resource integration and accurate assistance. In order to promote employment, Hangzhou municipal government uses 5G, AI and other technologies to create an online employment platform, which can match suitable jobs for swarm intelligence looking for jobs, including later enterprise interviews and signing tripartite agreements.

5 Conclusions and Recommendations

This paper empirically studies that the development of artificial intelligence technology is helpful to improve the quality of government public services, especially in public education, social security and employment. At the same time, in order to better apply artificial intelligence technology to other public services, the following suggestions are given:

Firstly, in terms of health care and family planning, the government should design the system framework and technical ideas for integrated development, encourage the establishment process of big data, blockchain and other infrastructure of major medical institutions, and build an effective health care platform. Secondly, in terms of public culture, sports and media, the government should use artificial intelligence technology to establish an intelligent service platform to timely transmit service information and establish a mechanism for service performance evaluation, so as to truly serve the people. Thirdly, in terms of science and technology, the government should use artificial

intelligence technology to establish a sharing platform for enterprise data and maintain smooth communication channels between the government and enterprises; establish an intelligent supervision platform to record and evaluate the whereabouts and performance of invested science and technology funds, so as to adjust the capital investment structure. Finally, in terms of agriculture, forestry and water, the government should develop a smart agriculture, forestry and water service platform with the help of artificial intelligence technology, big data and cloud computing, to promote the intellectualization of agricultural equipment, modernization of production process, efficient resource management and networking of service facilities, which is also conducive to the government's efficient management and promote its modern development.

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