Abstract

In the healthcare sector, the adoption of ICT is perceived as the main driving force in the unfolding healthcare reforms in many countries. This paper argues that rather than focusing on technological innovation in healthcare institutions as an end itself, developing countries should adopt a holistic approach to cultivate a more mature information culture in healthcare. This means building conditions and capacities for the collection, interpretation, and utilization of information resources. Giddens’ Structuration Theory is used to conceptualize information culture, which underlines the analysis of China’s information culture and its interaction with e-health development. The paper aims to contribute to the discussion of using information to improve healthcare, with particular reference to less developed countries.

1. Introduction

In recent years, the rates of adoption and diffusion of information and computer technology (ICT) have become important indicators of development. Many less developed countries (LDCs) have put technological innovation on top of their national development agenda and invested heavily into ICT. For example, in the healthcare sector, the adoption of ICT is perceived as the main driving force in the unfolding healthcare reforms in many developed and developing countries [2]. The adoption of ICT in healthcare is often called e-health [3]. The assumption behind these developmental policies is that investing in ICT is the path towards social and economic development [4].

However, many studies have found that ICT investment and implementation seldom yield expected outcomes [5, 6]. It has been pointed out that the key issue does not lie with technology, but with social factors such as culture, institutions, organizational issues, and individual identities [7]. Many national governments, including China, have set it as a goal to build an information society in the 21st century. Is prevalence of information technology sufficient to achieve this goal? Does ICT provide the tool, or the means for social and economic development?

The paper seeks to review the premium priority that technology diffusion is granted in LDCs. It argues that rather than focusing on technological innovation in healthcare institutions as an end itself, developing countries should adopt a holistic approach to cultivate a more mature information culture in healthcare, which should be considered a learning process to which ICT adoption contributes. This means building conditions and capacities for the collection, interpretation, and utilization of information resources in organizations and in society.

Contributions of the research firstly lie in the formal conceptualization of the term ‘information culture’, with Structuration Theory as a theoretical basis. Secondly, the concept is then applied to e-health development in China to demonstrate the importance and dynamics in the cultivation of an information culture. Finally, by integrating the theory and empirical data, the paper proposes a holistic approach of cultivating information culture as a developmental agenda for LDCs, which may provide some practical implications for developmental policies and interventions on e-health adoptions.

The rest of the paper is organised as follows. A brief literature review on ICT adoption in the health sector is presented in section 2. This is followed by section 3, where information culture is formally conceptualized and a theoretical framework presented. The discussions of the Chinese information culture and the Chinese experience in e-health are then spelled out in section 4. The paper concludes by drawing practical implications.

2. Literature review: ICT, healthcare and development

ICT development in healthcare is a profound arena with multilayer complexity, as it involves human, social and political concerns. It is also a dynamic and constantly changing area relating to healthcare reform efforts in many countries, developed or less developed. Mainstream research of ICT in healthcare covers a wide variety of topics, including, among others, medical informatics [8], electronic patient records [8, 9], evidence-based medicine [10], systems development [11], national policies [12] and legal and ethical aspects of IT in health [13]. These writings focus primarily on developed countries with advanced technological level. Some focus on providing extensive practitioner guidance, while some also bring in
theoretical insights, and methodological reflections (e.g. [14]). Overall, HIS has been underrepresented in the IS literature [15].

In the contexts of LDCs, there is also an extensive body of research in ICT adoption in the healthcare sector, very often based on empirical studies linked to development projects. Studies in this area cover topics like data collection and processing issues (e.g. [16]), poor information use [17], organizational and management issues [16, 18], and quality assurance [19]. This group of literature reveals an increasingly active awareness of theoretical and methodological issues. Many studies take a social-technical network perspective of ICT [20]. Actor Network Theory [21, 22] has been widely applied, looking at health information systems as a social-technical network consisting of a variety of actors and artifacts (e.g. [17]), and ICT innovation as a process of social translation [23].

There has also been an increasing interest in cultural issues in the processes of technology transfer, system implementation, and software outsourcing in third world contexts [24, 25]. Such studies highlight the significance of national and organizational differences like historical background and traditional norms, values and behavioral patterns. However, it is not uncommon that the concept of culture is used without clarification of its definition and recognition of its internal complexity. Examples of in-depth analysis and theorizing the impact of culture on ICT development include Walsham [26] and Boist [27]. In this paper, I will use the same theory to conceptualize information culture and its cultivation, to be illustrated in detail in section 3.

3. Development and Information culture

3.1. Development

While the term ‘development’ has often been used indiscriminately in all sorts of disciplines, it is in fact problematic and ideologically controversial when it comes to mean efforts towards social economic progress. Over the years ‘development’ has been used to refer to economic growth, industrialization, or modernization, often embodied in a range of social-economic indicators, such as GDP, per capita income. This perception of development does not capture many important aspects of development, such as education, healthcare, human rights and freedom of express [28]. Escobar [29] presents the ideological dynamics and struggles of power and dominance behind the discourse of ‘development’ as led by western developed countries and international organizations. Castell [30] talks about ‘marginalization’ of some underdeveloped societies that are being left out the process of globalization. In the Information Systems field, Avgerou [31] comments that the concept of ‘development’ has been institutionalized, and ‘amounts to taking for granted the striving to achieve certain socio-economic conditions’.

Sen [32] in particular is critical of the economic concentration of income and wealth ‘rather than on the characteristics of human lives and substantive freedoms’. He calls for the a reexamination of the concept of inequality, and proposes the ‘capability approach’ towards development, namely, to focus on the capabilities of people to lead a life that they consider valuable, rather than on the metrics of their wellbeing [32-35]. Embracing the spirit of ‘substantive individual freedom’[32] of the capability approach, I propose a concept of information culture in the following section as a theoretical framework for our assessment of e-health in developing countries.

3.2. The concept of information culture

The concept of information culture is not a new one. Elements of information culture, such as users’ perception towards information, social values and patterns of behavior related to the collection, interpretation and utilization of information are present in the IS literature [36]. Davenport [37] calls for a shift of focus from information technology to information culture to achieve bigger business success, calling it human-centered information management. Chepitis [38] also talks about the change of ‘information culture’ that occurred with the transition of the economic system in Russia.

The importance of developing an appropriate information culture has also been recognized in the area of health information systems. Simwanza [39] uses the term to refer to ‘a culture of constant use of data’ around the health management information system in Zambia. RHINO[40] stresses the significance of shaping a ‘culture of information’, in particular relating to the attitude and experience of health managers in using information to facilitate decision making and actions. In South Africa, it is put on the agenda to ‘create a culture of information use at all levels’ [41].

However, very often the term ‘information culture’ is taken for granted, and used without a clear definition or theoretical discussion, with a few exceptions. Dutta [42] defines it as ‘specific organizational norms and practices guiding the patterns of information sharing and dissemination’. Widén-Wulff [43] conducts a qualitative study of the business information culture of a Finnish insurance company, defining the information culture as ‘about formal information systems (technology), common knowledge, individual information systems (attitudes), and information ethics.’

An example of theorizing the concept of information culture is Martin et al [44], who use an information culture approach to explore the gap between business and IT. They define information culture as ‘a system of shared meaning, manifested in the formal and informal
information systems that are enacted through people, processes and technology [44].

There has apparently been no consensus on the term of information culture. One can find different insights from different authors mentioned above. There is however a need for a deeper, more synthesized and theorized conceptualization. Towards such an end, the author ventures to offer a working definition of information culture, notwithstanding the complexity of such a concept: the general capability, views, norms and rules of behavior, with regard to accessing, understanding and using information in a social collectivity.

This definition takes two stances that may differ from some writings on this subject in various ways. Firstly, information culture cannot be ‘created’ or ‘established’ [32, 34]. It has always existed, as one dimension of culture, national or organizational. Information culture can be conceptualized at multiple levels of society, institutions, and individual actions. It is deeply rooted in historical and social settings, yet is constantly evolving over time. Information culture of an organization can be cultivated, developed, or shaped, subject to appropriate management and institutional formulation.

The second stance of the definition differs from Martin et al [37] in that, technical systems, though could be crucial in our analysis of information culture, are not considered constitutive of information culture here. It is argued here that technology is part of the resources human beings draw upon to shape their information culture. How technology is used reflects, and is at the same time constrained, by the information culture within which it is located. On the other hand, information culture exists with or without information technology. In short, the concept of information culture applied in this paper focuses on information, rather than technology.

Here, the concept of information culture is also underscored by its relations with development. As far as culture is concerned, it is usually not appropriate to say that a certain national culture is superior to another. Nevertheless, when we try to look at information culture from the perspective of developmental outcomes, for instance better healthcare delivery, one can argue that there are better ways of using information resources than what is currently the case in many parts of the world. For example, keeping the public informed of epidemic information can help prevent its spread. Therefore, access to information should be encouraged and provided even though it is not in favor of the traditional way of handling information.

In the following section, a more comprehensive conceptualization of information culture will be presented, using Giddens’ Structuration Theory as a theoretical basis.

### 3.3. Theoretical basis: a Structuration view of information culture

#### 3.3.1 The Information Culture Framework

The choice of Structuration Theory in the current context stems from a need to move away from the dichotomy of structure and agents prevalent in most discussions of culture and institutions in societies, while culture and institutions are the two main factors embodying the concept of information culture being proposed in this paper. Furthermore, the three modalities of structuration will be adapted to demonstrate the three dimensions of information culture. Structuration Theory [45, 46] has been applied in various areas for various purposes, and in occasion with varying interpretations, e.g. in accounting and organization theories (e.g. [47-49]). It has also been adopted by some researchers in the information system discipline in the last decade [14, 50-52]. For a full review please refer to Jones [53].

Structuration Theory describes structure in the three dimensions of signification, domination and legitimation, interacting with human action of communication, power and sanctions through the three modalities of, respectively, interpretive schemes, resources and norms, as illustrated by Figure 1. A central core of Structuration

![Figure 1. The three dimensions of the duality of structure. (after Giddens [1])](image-url)
Theory is the duality of structure, which refers to the 'essential recursiveness of social life, as constituted in social practices: structure is both medium and outcome of the reproduction of practices'[46]. The emphasis is therefore on structuration as an ongoing process rather than structure as a static property of social systems. Structuration is thus seen as a means of breaking out of the unsatisfactory dualism of action and structure and also that between individual and society [53].

The concept of structure, defined by Giddens, refers to 'structuring properties', which 'can be understood as rules and resources, recursively implicated in the reproduction of social systems'[45]. This concept serves to holistically encapsulate the concept of information culture as the totality of structural properties of a collectivity, e.g. an organization or a nation, related to the understanding, views, norms, and patterns of use of information. Information culture, as a structure in a structurational sense, is 'subjectless' and 'exist out of time and space', and only as 'reproduced conducts of situated actors with definite intentions and interests. [45]' Meanwhile, structures, being rules systems, are 'less unified' than game-rules; they are inherently ambiguous, and subject to 'contested' interpretation, application and use. Thus to talk about information culture is not to talk about a unified, unambiguous set of norms and values shared by its constituent members. Yet as Giddens says, 'when related to a totality of collectives, as an integrated system of semantic and moral rules, we can speak of the existence of a common culture [ibid].'

The three modalities in Structuration Theory --- interpretive scheme, facility, and norms, --- provide a suitable framework to explore the content of information culture. Abstract and general as they are designed to be, the three modalities enable us to view information culture as embodied firstly in the interpretation of information, secondly in the forms of domination regarding the sharing and use of information, and thirdly in sets of norms concerning the collection, dissemination and utilization of information resources. To make it more accessible, we can label the three modalities as information literacy, namely the capability of accessing, interpreting and using information; information freedom, which refers to the availability and transparency of information in an organization or society; and information norms, namely formal and informal concepts and rules of behavior with regard to information activities. They are three interrelated and interactive aspects of an integrated whole. Figure 2 presents the adapted framework.

### 3.3.2. Information Literacy

Extensive discussions have been carried out among the international communities as to what is Information Literacy (IL), and how to create an information literate society. According to the definition created in 1989 by the American Library Association’s Presidential Commission on Information Literacy [54], an information literate person refers to someone who is able ‘to recognize when information is needed and have the ability to locate, evaluate, and effectively use the needed information.’ The 21st Century Literacy Summit held in Berlin in 2002 gave a similar definition of Information literacy, which is ‘the ability to gather, organize, filter and evaluate information, and to form valid opinions based on the results.’

Information literacy is not equivalent to ICT literacy or media literacy. ICT literacy or media literacy refers to the ability to assess, evaluate and communicate with ICT technology or media technology. These capabilities are certainly essential in the 21st century in countries and areas where such technology is commonly available. Nevertheless, information literacy implies a much wider range of capabilities which form the basis of lifelong learning, with or without technology. Standards of information literacy have been developed in the USA

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![Figure 2. A structurational framework of Information Culture](image-url)
information culture is presented as referring to rules and resources. In my structurational
3.3.3. Information Freedom
critical opinion.
evaluate information, and upon which to form one’s
citizen to have the awareness and ability to assess and
maintain and develop the living and moral standards of a
democracy requires a civil society which enjoys extensive
access to information, public debates, and the ability to
maintain and develop the living and moral standards of a
society. It is therefore the basic quality of a democratic
citizen to have the awareness and ability to assess and
evaluate information, and upon which to form one’s
critical opinion.

3.3.3. Information Freedom

The modality of ‘facility’ in Structuration Theory refers to rules and resources. In my structurational
framework, the rules and resources domain of the
information culture is presented as information freedom,
underlining the rights, authorities, and allocation of
resources governing the distribution and accessibility of
information. In the context of modern nation states,
information freedom refers to public access to
information, freedom of express, and government
transparency. This is an important component of the
information basis for a democracy. The public not only
needs to be information literate, but more importantly, to
have access to information that they are entitled to,
especially concerning public policy and government
operations. Freedom of information has become
recognized as an important part of human rights when
many national governments transit into democracy in recent years. Over 40 countries now have constitutional
provisions on access of information [57].

The expansion of the internet into everyday usage has
also greatly increased the public demand for more
information, especially from firms and civil society
groups. Meanwhile, the need to set up a modern image of
the governments by moving towards e-government has
promoted the dissemination of information as a goal in
itself. Over 50 countries in the world have adopted a
comprehensive Freedom of Information Act, half of which were only adopted in the last 10 years [ibid]. Although the majority of those countries are industrial or
developed countries, it is evident that the developing
world, including Asia and Africa, is moving in the same
direction. For instance, South Africa enacted its law in
2001. In an information society, with a developed and
healthy information culture, it is indispensable that public
information and government records be transparent and
widely available to the knowledge and scrutiny of
citizens.

3.3.4. Information Norms

I label information norms as the third dimension of
information culture hitherto defined. Information norms
concern the rules of behavior applied to the allocation,
evaluation, interpretation, and usage of information.
Analytically, information norms fall into two categories:
the first being informal behavioral patterns of individuals,
related to cultural norms, values, and conventions; and the
other capturing formal institutional rules which could
include laws, regulations, and hierarchical settings. In a
sense, information norms underpin both information
literacy and information freedom. Indeed, the three
modalities of information culture are more close to an
integrated whole than three separate dimensions with
clear boundaries. The concept of information norms
provides us with an analytical tool to explicitly address
the very often subtle and ambiguous issues of culture and
its role in social life. Cultural and institutional settings are
the basis of the formation of information norms.

4. Information culture and China’s e-health

In this section, I will apply the concept of
information culture in the Chinese social context,
demonstrating the dynamics of the interaction between
existing cultural and institutional settings of informational
phenomena, and the development of hospital information
systems and public health networks. The empirical data is
drawn from my intermittent fieldwork in Beijing and
Guangdong province of China from 2002 to 2004, in three
visits totaling 6 months. I have taken an interpretivistic
stand, focusing on exploring and understanding the social
phenomena of how information culture influence and
interact with e-health adoption in China. A variety of
qualitative research methods were deployed, including
open-structured interviews, participatory observation,
shadowing, secondary documents collection, and
questionnaire interviews. Only a small selection of data
relevant to the present discussion will be presented here.

4.1. Background

The Chinese government adopted a developmental
policy of ‘informatization’ in 1992, actively promoting
ICT development in the major industries, including the
healthcare sector. From 1994, hospital information system
(HIS) was enforced as a major criterion in the hospital
ranking system, resulting in the national-scale
implementation of HIS. Most of these systems were
simple financial billing systems, due to the shortage of competent information systems providers in China (in contrast to the thriving off-the-shelf software industry). HIS diffusion has also been pushed by the healthcare reform since 1997, under which public hospitals have been slowly losing government protection and facing market competition. ICT adoption became symbolized as part of a modernized and competent image of the health provider. Consequently, many hospitals have invested heavily in adopting HIS, which in some hospitals have gradually evolved from simple financial systems to integrated management information systems capable of capturing considerable amount of patient information. There had been hardly any construction of regional and national health information network until after the SARS epidemic outbreak in year 2003.

However, hospital information systems have not brought back rewards for their high costs. In the area of HIS, as with most other IT applications, a technology-driven view predominates. The predominant concerns lie with the standards of technology and technical methods, much more than how IS can be embedded in the hospital context and effectively support management and patient care. Technology is valued over information. This is reflected in both government policies, which prioritize infrastructure building, while lacking a human-oriented approach of ICT development, and hospital management, which still regards HIS as the responsibility of technicians, and often excludes clinical staff in the processes of system development and implementation. ‘Our HIS development has gone too far ahead of our management’, said a HIS manager in one of the biggest hospitals in Beijing, ‘too much expectations have been put on information systems, which are unrealistic without managerial, institutional and cultural support.’ In fact, what this interviewee has pointed out is exactly the lack of information culture to enable the effective use of information systems.

For a more in-depth look of China’s information culture, I will use the structurational framework provided above, and examine it from the three interrelated aspects of information literacy, information freedom and information norms. Again, the discussion is divided into three parts only for analytical purposes, not because the three elements are separable and distinguished from each other. I will start with information norms because it gives us a preliminary understanding of the cultural context against which the following discussions are placed.

4.2. Information Norms

Many scholars have conducted extensive studies in the remarkable differences between Western and Chinese people in the way they comprehend the world. The thinking pattern of the Chinese has been found to be particularly quintessential compared with the Western one. Northrop (1900) was quoted by Redding[58] to say that the Chinese perceive the world as an ‘undiifferentiated aesthetic continuum’, in which ‘methods of intuition and contemplation become the sole trustworthy modes of enquiry’. The Chinese mind is described as non-analytic, utilitarian, and pragmatic, and the Chinese way of thinking is more concrete and confined solely to the realm of the immediately apprehended, and remains on the periphery of the visible world. Nearly one century later Boist’s [27] describes China’s information culture as fief-like, which lingers at the lower region of the Information Space, namely towards the uncodified end of the scale, due to the lack of institutionally embedded economic and administrative rationality. Abstraction and codification of information are often blocked because ‘the reliance on personal power and interpersonal accommodation characteristic of fiefs would always be preferred’ [ibid]. This is echoed by other research on Chinese management especially in state-owned industries [59-61].

While I do not fully agree with all the above interpretations of the ‘Chinese mind’, it is true, though, one would observe some elements of them in both traditional and modern Chinese societies. Thousands of years of feudal and paternalistic governance and endorsement of Confucius doctrines have left a strong component of power hierarchy in Chinese culture, which entails a respect towards superiority, in social structure, working place, community, or family. Therefore, it often remains unchallenged, or even considered legitimate, that information is withheld, not for the benefit of the public, but rather for the maintenance of the power structure. When inequality is taken for granted, it is not surprising that access to information is hardly considered an intrinsic right of members of the society. The same characteristic can be found in many other Asian countries under Confucius influences, such as Korea and Singapore. Institutionally, the authoritarian regime, the under-developed rule of law, and a transitional economy with a mixture of state control and market mechanism create a scenario of ‘modernisation with Chinese characteristics’. New and old, traditional and innovative norms are brought together, coexisting and interacting.

Among these dynamics, HIS adoption in China has not been straightforward. On the other hand, within the obstacles hide the seeds of changes. A HIS manager remarked, ‘[i]t has been said that the success of informatization determines the fate of the country and the (Communist) Party. It may sound a bit extreme, but what it means is that only information systems can change the traditional personal governance to modern rule-based management.’ In other words, informatization has to include not only technological innovation, but also changes of information norms.
4.3. Information Literacy

Two factors are related to information literacy: basic literacy to read and write, and the use of information technology. Mainland China has an adult literacy rate of 85.8% [62]. The nine-year compulsory education scheme was started since the 1950s, which aims at providing education to all children at the age of 7-15. The scheme was legislated in 1986. By the end of year 2000, 85 percent of China's population had received the nine-year compulsory education. The number of illiterate adult amount to more than 140 million, among which about two thirds are female [63].

Over the last decade, China has witnessed fast development in ICT popularization. According to the 13th Chinese Internet Development Survey [64], by the end of 2003, there were 7.95 million internet users in China, an increase of 34.5% compared to the number one year ago. Over three million computers had been connected to the internet, 48.3% more than the previous year. Meanwhile, the total international bandwidth had also grown to 190.1% of what was 12 months ago, amounting to 27216 M. The following diagram shows the increasing curve of the above statistics. The majority of the internet users are at an education level above senior high school and over half of them have college degrees or higher.

The statistics indicate that China has made great progress in terms of basic literacy and the adoption of information technology. While information literacy, the ability ‘to locate, evaluate, and effectively use information’[56], may be facilitated by basic literacy and computer literacy, it requires a much wider set of skills. Such skills, however, are not sufficiently developed in Chinese high education. The Chinese education system suffers from the rigidity of education methods and the tendency to develop students’ skills in memorizing answers rather than analyzing problems. Most college students spend their time studying their textbooks in order to pass exams, rather than doing research in the library and on the internet. In recent years, however, education reforms have been carried out in China involving most universities, middle schools and primary schools, which have made some changes to their curricular and exam systems. The effects of these reforms are yet to be evaluated.

The health sector is one that is generally staffed at a relatively higher education level than other sectors. Most medical workers have college degrees or professional diplomas. This allows ICT to be better accepted and promoted by the potential users. Nevertheless, ICT is hardly used to facilitate managerial decisions, with the exceptions of some advanced hospitals. A HIS system developer told me that their project omitted the decision support system in the hospital, ‘because the directors didn’t know what to look at,’ even though ‘the directors usually have the best computers with the biggest screen on their tables’.

4.4. Information Freedom

As the largest developing country where a big number of people are still struggling with poverty, the right of living is considered by the Chinese government as the most important human right. Thus protecting freedom of information has not been a priority. Traditionally the public only passively receives government information through the major media. With the progress of e-government projects in the last two years, most government institutions and departments have set up websites that provides, not exactly online public service, but some public information and government documents. At the same time, the state exercises relatively strict censorship over the press and the internet.

At the beginning of year 2003, an epidemic that was named Severe Acute Respiratory Syndrome (SARS) started in the Guangdong province of China, and rapidly spread to Hong Kong and other areas of the world, causing more than 800 deaths globally, out of nearly 7500 cases. It was found out later that at the initial stage of the epidemic, information had been hidden by the government in order to avoid social panic and economic losses. This was criticized by the WHO, resulting with
two senior government officials being removed from their positions. After that, the Chinese Health Ministry held daily press conference to release the numbers of accumulative and additional cases. The press was given unprecedented freedom to report the epidemic. SARS became an opportunity that drew international attention to China’s information freedom and government transparency.

A senior official at China CDC remarked, ‘I believe we have to do it step by step. It has to be a long process to achieve transparency. It is impossible to change things overnight. I am against classifying epidemic information, but we need to be patient with improving our public health. We have obviously seen some improvements, such as releasing the epidemic information to the media each month, lowering the level of classification of some information, etc. In fact, SARS, a disaster as it was, indeed stimulated the improvement of information communication.’

In fact, information of epidemics had always been classified as state secrets. According to the law, local authorities should not reveal information about infectious disease to the public unless so authorized by the Chinese central government or China health ministry [65]. By contrast, there has not been any national legislation on information freedom and access to government documents in China. The first local provision on freedom of information in China, Guangzhou Municipal Open Government Information Provision, went into effect in Guangzhou, capital city of Guangdong Province, on 1st Jan, 2003[66]. On 1st May, 2004, the largest city in east China, Shanghai, adopted the Provisions of Shanghai Municipality on Open Government Information, which ‘represents the most comprehensive framework to date in China for accessing government-held information [67]. To date the Chinese State Council is still drafting the freedom of information legislation at the national level. With the strike of SARS, it is possible that the process of passing the legislation will speed up.

Moreover, the SARS event also accelerated the development of public health information systems. In 2003 the health ministry planned to construct five public health information systems [68]: 1. the SARS direct report system; 2, the epidemic and emergent public health events monitoring system; 3 the medical rescue information system; 4, health legislation and inspection information system; and 5, directive center and decision support system responsive to emergent public health events. At the time of research, most of these systems were still at their early stages of being developed. However, a SARS direct report system was miraculously built up in less than 6 months, and was formally put into use on the new year’s day of 2004. At the same time, standardization of hospital information system was also placed on top of the agenda by the department of health, according to a member of the national health informatization steering committee. Indeed, SARS, having exposed weaknesses in China’s information openness, became a turning point for the country’s e-health development, which will undoubtedly in turn contribute to the progress of information freedom and government transparency.

5. Conclusion

Real development does not mean merely an increase of wealth, but also the enhancement of capabilities, including better education, healthcare, and freedom of choice. The paper has built the concept of information culture with a structurational framework, and demonstrated the interrelationship between information culture and the development of e-health in China. It is clear that a technology-driven view of so-called ‘informatization’ inevitably falls short of its goals. To truly step into the Information Society, China and other developing countries need to adopt holistic approaches that are sensitized towards cultivating a modern information culture, and to make incremental social institutional changes alongside technological innovations.

Education institutes should explore appropriate ways and set up standards to improve the information literacy of students and citizens. Such attempts may benefit from, and meanwhile facilitate, promoting and legislating information freedom and government transparency. It forms the basic fabric of a democracy that citizens should have the awareness of their rights, and the ability to access public information. As the levels of information literacy and information freedom are very often conditioned by conventional and institutionalized information norms embedded in a society, their changes will also dialectically affect the evolution of information norms. Like other technological innovation aimed for modernization and a better end of development, e-health has to be grounded in incremental social development to become effective and sustainable. The structurational framework of information culture has offered some theoretical and practical guidance.
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