E-government portals: a knowledge management study

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Abstract

Purpose – In view of their significance as well as influence, this article aims to examine knowledge management (KM) mechanisms in 20 Iranian e-government portals used to provide services to citizens.

Design/methodology/approach – Using the model "knowledge access, creation and transfer" (K-ACT), a checklist was developed. This checklist was then applied to demonstrate its utility for evaluating 20 Persian-language official e-government portals in Iran.

Findings – The maximum score for the knowledge mechanism was 30 for knowledge creation. The mean score for KM in Iran e-government portals was 26 per cent. This percentage indicates that e-government portals in Iran are very poor.

Practical implications – Iranian e-government portals and Iran governors must consider some features in their decisions about portal design. This area requires further work, in particular in elaborating the relationship between e-government and KM. In addition, planning strategically with key experts to design new models for the adoption of KM in e-government is of high importance. These experts can be computer specialists, knowledge managers, librarians, portal designers and users of portals.

Originality/value – This study provides an insight into the situation of KM processes in the portals of Iranian ministries.

Keywords Knowledge management, Knowledge access, Knowledge creation, Knowledge transfer, Government portals, E-government, Iranian ministries, Iran

Paper type Research paper

Introduction and significance

Increasingly, governments all over the world are adopting information communication technologies (ICTs) to carry out their activities and operation resulting in what we may call today e-government (Mnjama and Wamukoya, 2007). E-government is the new challenge for public administration in the twenty-first century (Parycek and Pircher, 2003). According to Davenport *et al.* (1998) (quoted in Salleh *et al.*, 2009), e-government seeks to improve government operations through internet-enabled operations and ICT aimed at enhancing the government's service delivery, constituency participation and governance. In the interim, specifically, the application of advanced information

technology to public service has brought new attention to the ability of government agencies to coordinate and enable the creation, integration, management, sharing, and transfer of information within agencies and in governmental networks (Kim and Lee, 2004). Therefore, e-government refers to the use of ICTs by government agencies at different levels to re-design and transform relations between governments and businesses (G2B), governments and citizens (G2C), and different government agencies (G2G). Such transformations in turn would serve a variety of different ends – reducing cost, improving efficiency and effectiveness, better delivery of government services to citizens, improving interactions with business and industry, and citizen empowerment through access to information (Bonham *et al.*, 2003).

In the e-government environment, the knowledge management (KM) strategy plays a central role. There is an increasing emphasis on the importance of KM beyond information system management in both the private and public sectors (Barquin *et al.*, 2001; Davenport *et al.*, 1998; Davenport and Prusak, 1998; Gold *et al.*, 2001; Ruggles, 1997; Quigley and Debons, 1999; and Thurow, 1999; quoted in Knowledge Management in Electronic Government, 2004). KM can transform knowledge which resides in several knowledge locations including people, processes, and technologies into value creation organizational capability in order to sustain a high performance organization in this rapid changing environment (Quinn *et al.*, 1996).

Based on Goh *et al.* (2008), many governments have actively launched KM projects to meet the needs of the public, who are increasingly demanding high standards of quality, courtesy and responsiveness. In this respect, Nah *et al.* (2005) declare that countries where e-government initiatives are implemented typically employ web portals as the gateway to the government and its services. Portals can collect, organize, and distribute knowledge; thus they are focal points for information and knowledge exchange.

Apart from providing functions specifically contributing to KM, portals can provide their users with many features, such as, e-mail, chat rooms, personalized news, and a search engine, all of which benefit information and knowledge exchange. KM portals are an extension of the portal concept, with the purpose of adding superior knowledge representation, search capabilities, and supporting knowledge workers in their activities. They provide tools to extract, analyze and categorize both structured and unstructured information, and reveal the relationship between content, people, topics and user activities in the organization (Wagner *et al.*, 2003). Zhang and von Dran (2001) argue that e-government portals are similar to e-commerce websites in terms of benefits to users. In the same year, Watson and Mundy (2001) introduced the concept of e-democracy, which entails two elements: e-government and e-politics. Whereas e-government provides citizens basic information about the government, e-politics refers to the use of the internet technology to improve the effectiveness of political decision-making by making "citizens aware of the how and why of political decision-making and facilitating their participation in this process". Consequently, the ultimate objective of e-government is to develop e-democracy which allows both effectiveness and efficiency of governments to serve citizens. In a word, as Mutula and Mostert (2010) declare, many countries the world over are now well aware of the benefits that e-government can bring to improve service delivery to citizens. Hence, because of significance as well as influence of e-government portals, this article aims to study KM mechanisms in 20 Iranian e-government portals.

KM and design of government web portals

KM is a crucial consideration in e-government portals to ensure that knowledge flows efficiently between governments, citizens and organizations. KM involves the identification and analysis of available and required knowledge assets and knowledge asset-related processes, and the subsequent planning and control of actions to develop both the assets and the processes so as to fulfill organizational objectives. KM is not only about managing these knowledge assets but managing the processes that act upon the assets. These processes include developing knowledge, preserving knowledge, using, and sharing knowledge (Durrant, 2001). On the other hand, government portals are environments that must deal with significant amounts of information and knowledge. This huge amount of information and knowledge is produced in government organizations and transferred to governmental portals. Portals do not create any information and knowledge, but they can collect, organize, and distribute it; thus they are focal points for information and knowledge exchange. As well as governments and citizens around the world are experimenting with the new information technologies such as portals; this is good opportunity to apply KM techniques to the domain of e-government. KM concepts and tools can really provide great support to exploit the huge knowledge and information resources and assist e-government introduction into a modern public administration in an effective way (Kesavarapu and Mun-Kee, 2009). When information and knowledge of government portals managed successfully, it can enhance government agency operations by raising employee productivity.

Use of KM concepts in governmental portal design can be very useful. By using KM considerations in portals, designers must to apply KM dimensions and sub-dimensions at their works. They must design a new extension of the portal concept, with the purpose of adding superior knowledge representation, search capabilities, and supporting knowledge workers in their activities. As a result of this, users ideally receive information and knowledge that best suits their needs (Wagner *et al.*, 2003).

Evolution of e-government in Iran

The first coordinated and inclusive activities in the government sector of the country for extending information technology and implementing e-government was provided and legislated in the shadow of "Iran Development and Use of Information and Communication Technology Plan (TAKFA)" by the Organization of Management and Planning (Secretary of High Council of Informatics, 2002). It was approved by Ministers Council on 25 July 2000 and was referred to related organizations including the High Council of Informatics for execution (Secretary of High Council of Informatics, 2002). According to the strategic plan provided by the Organization of Management and Planning, seven areas of information technology strategic planning were considered as the country's future activities: e-government, extending information technology application in education and training and developing digital skills of the country human resource, extending information technology application for improving social services, extending information technology application in the field of culture, art and promoting Farsi (Persian) script and language in cyberspace, extending information technology application in economy, commerce and business, extending information technology through establishing small medium enterprises (SMEs) in research parks (Moghaddasi and Feyzi, 2005). Also, the plan for implementing

e-government was approved in 2000 by High Council of Informatics and was referred to related governmental organizations for implementation.

The details of the Iranian e-government strategic plan are: government virtual private network (VPN), automation of planning and budgeting system, automation of income system (treasury), traffic and driving and execution affairs, creating web portals for governmental organizations and delivering databases of government services delivered to people, providing the draft of laws and plans related to management entities in digital space at national level, creating suitable information infrastructures and information highways required for the country, creating national governmental portals, master plan of ICT (Atashak and Mahzadeh, 2008). Moreover, the Iranian Majlis (parliament) approved the allocation of over 100 million dollars for the development of ICTs in public organizations in the year 2003. Henceforth, the cabinet ratified a detailed program for implementing several national information and communication projects. The program included projects in the fields of e-government, e-commerce, e-banking, e-learning and e-health.

In order to prepare the needed culture, another significant effort to make people, public organizations and private sector familiar with e-government was to hold national and international exhibitions. The first e-government fair was held in Tehran in late December 2003. One other effort to foster the required culture is publishing various periodicals including one by the Organization of Management and Planning titled as Payam-e Tahhavvol Edari (Message of Administrative Development). Iranian cabinet, Majlis (parliament), and the Supreme Administrative Council have had different key approvals and sanctions concerning e-state in the Islamic Republic of Iran. A variety of activities have been also predicted and fulfilled throughout the country. For instance, all governmental organizations have been ordered to use only.ir TLD (top level domain) for their internet addresses since March 2003. Also, the Organization of Management and Planning offered to pay for part of the costs of designing and creating their websites, if they only followed the Organization of Management and Planning's guidelines (Ashrafologhalaei, 2005).

Related literature in brief

As mentioned by Goh *et al.* (2008), there is much literature on e-government portals and KM, with topics such as the importance of KM in e-government (Harman and Brelade, 2001; Zahavora and Zelmene, 2004), KM strategies for the public sector (Misra *et al.*, 2003), the technological infrastructure needed to support KM (Heck and Rogger, 2004), the structure of such portals (Everisto and Kim, 2005) and the effectiveness of service delivery through such portals (Daniel and Ward, 2006).

West (2001) investigated US federal and state e-government websites for their information, services, privacy and security, disability access, foreign language support, and democratic outreach. He found that federal government websites did a better job of offering information and services to citizens than did state government websites while overall big improvements could be seen at both levels over years.

Accenture's (2003) study of e-government portals found that customer relationship management (CRM) underpins e-governments and that this belief was growing among government executives. The study emphasizes that "as governments rethink their strategies to focus on delivering value; they must also create a customer impact". Additionally, they found that e-government progresses through a series of levels, with

improvement required year on year just to keep pace with the rest of the world. As governments reach the top of a maturity stage, they hit a plateau, where further progress based on the current course of action is impossible. Moving to a higher stage of maturity requires more than this incremental progress. Governments that do not rethink their e-government strategies to focus on ways of adding value will find that their progress has stagnated and they may be overtaken by other more nimble countries.

Choudrie *et al.* (2004) studied a cross-section of e-government portals from accessibility, quality and privacy perspectives, using a common set of performance metrics and web diagnostic engines. The research results show that not only are there wide variations in the spectrum of information and services provided by these portals, but that significant work still needs to be undertaken in order to make the portals examples of "best practice" e-government services. Norris and Moon (2005) conducted two nation wide surveys to investigate local government adoption of e-government, website sophistication, and the perceived impacts of e-government, and barriers to the adoption and sophistication of e-government. They found that e-government adoption by the grassroots governments was progressing rapidly. Huang (2006) investigated US counties' e-government adoption and the functions of the websites by using content analysis methodology. To do this, the services, functions, and features of US county e-government portals were scrutinized. The investigation instrument was established upon political and technological theories, e-government progress models, and comprehensive literature review. The research found that the US counties' adoption of e-government portals was highly associated with certain social and economic factors.

In a case study, Daniel and Ward (2006) studied the development and early stage deployment of enterprise portals within two country councils in the UK, West Sussex and Hertfordshire. Finally, they found that in both cases the portal is seen as a key element of their e-government activities, enabling the councils to meet central government targets in this area. The intention is for the portals to provide a single location for residents, businesses and council staff, wishing to access the online information and transactional services provided by the councils. The portals offer the councils a number of very significant benefits that will improve service delivery to citizens, including the ability to share information across their own directorates and also to improve working with other agencies.

Sidoroff and Hyvonen (2006), studied how semantic search and browsing techniques can be applied to solving the problems of content discovery, aggregation, and linking in e-government portals. They realized that the idea of linking and accumulating semantic content with logic rules is important in many ways. Human editing and maintenance effort can be reduced, because linking is created and enhanced automatically by OntoViews (a generic semantic portal tool) based on metadata and ontologies. Maheshwari *et al.* (2008) did some research motivated by a need to develop a comprehensive framework of managerial considerations for design and development of e-government portals. Eight key considerations (segmentation, services, navigation, content management, implementation approach, governance, take-up strategy and IT architecture) in the design and development of an e-government portal were identified based upon the review of literature and their study of several e-government portals.

This brief literature review shows that there are many studies done in relation to e-government and its implementation, technical aspects and services. But only a few were about KM in literature. For this reason, in this research we surveyed a new aspect

that has been addressed in (Goh *et al.*, 2008). In their study, an evaluation model known as knowledge access, creation and transfer (K-ACT) is presented which identifies three KM mechanisms for portals: knowledge access, creation and transfer. Each mechanism is characterized by a set of dimensions and sub-dimensions representing the tools and features for supporting that mechanism. The model was derived from an analysis of the literature and validated by two independent reviewers who were trained in information science, were familiar with the objectives of the project and understood the concepts underlying KM implementation in portals. Using this model, a checklist was developed and applied to 60 e-government portals in the Asian and North American regions to investigate the extent to which these KM mechanisms have been implemented. Consequently, building this research based on previous studies mentioned above especially Goh *et al.* (2008), we propose the evaluation framework for Iranian e-government portals.

Methodology

As mentioned earlier, an evaluation model known as K-ACT is presented which identifies three KM mechanisms for portals, namely: knowledge access, creation and transfer. Using this model, a checklist was developed which was subsequently applied to the evaluation of 20 Persian-language official e-government portals in Iran. These 20 portals are formal ministries' portals for e-services to Iranian citizens. In fact, Iran has 21 ministries but the Ministry of Intelligence had no formal portal (Appendix). The K-ACT model attempts to extend on existing work in this area (see Goh *et al.*, 2008) by proposing three mechanisms for KM in web portals:

(1) *Knowledge access*. The mechanism through which users obtain access to the knowledge in the portal.

(2) *Knowledge creation*. Which includes both the acquisition of knowledge about the user and the acquisition of knowledge from the user.

(3) *Knowledge transfer*. Supporting user-to-user flows of knowledge.

Here, the focus is on tools for knowledge sharing among individuals and organizations that have access to the portal. Table I provides an overview of the model.

Generally, our main question is "what is the status of KM in Iran e-government portals?" This question itself consists of three sub-questions as below:

(1) What is the status of knowledge access in Iran e-government portals?

(2) What is the status of knowledge creation in Iran e-government portals?

(3) What is the status of knowledge transfer in Iran e-government portals?

Following the evaluation of these three parts, then the overall KM in Iranian e-government portals is evaluated.

Q1: What is the status of knowledge access in Iran e-government portals?
The number of the features considered for knowledge access was 22. In Table II, the findings about the knowledge access dimensions are provided. The table shows that the maximum possible score for the knowledge access mechanisms was 100 (access to portals). The minimum score was 10 for accessibility of Iranian e-government portals. Only 26.4 percent of the knowledge access features were found to be available in Iran

KM mechanisms	Dimensions	Sub-dimensions
Knowledge access	Access to portal	
	Search	Query
		Results display
	Browse	
	Personalization	User-driven personalization
		System-driven personalization
Knowledge creation	Accessibility	
	Information presentation	
	User information acquisition	
	Feedback	
	Domain data acquisition	
Knowledge transfer	Online collaboration	Organization-to-user collaboration
		User-to-user collaboration
	Information alerts	
	User support	
	Resource sharing	

Table I.
The K-ACT model

Access to portal	Knowledge access dimensions (%)				Information presentation	Total mean (%)
	Search	Browse	Personalization	Accessibility		
100	32	18.3	23	10	31	26.4

Table II.
Knowledge access dimensions mean scores

e-government portals. The result of Table II indicate that these portals are very poor in knowledge access.

Deeper analysis of the findings indicated that certain ministries (e.g. "Commerce", "Defense and Logistics", and "Culture and Islamic Guidance") have had more conformity (60 percent) with sub-dimensions and features defined under knowledge access dimensions. Moreover, sub-dimension "personalization" has been observed more (63 percent) by the ministries of "Communication and Information Technology", "Health and Medical Education", and "Industries and Mines". Sub-dimension "accessibility" has been little considered (10 percent) in Iranian ministries because 13 ministries have not observed any of its features. In other ministries which have observed accessibility, only the feature "multilingualism" was considered. As a result, sub-dimension "accessibility" is the least observed one compared to other sub-dimensions considered in the study. Finally, sub-dimension "information presentation" was considered more (75 percent) by the Ministry of Communication and Information Technology.

Q2: What is the status of knowledge creation in Iran e-government portals?
In the checklist, knowledge creation has six features. Table III shows related findings about these features score in the research society.

As shown in the table, the maximum score for the knowledge creation dimension was 100 percent (feedback), and minimum score for the knowledge creation dimension was 20 percent (domain data acquisition). Also, the mean score for knowledge creation

was 30; on the other hand, only 30 percent of the features in this mechanism were implemented. It is notable that sub-dimension "feedback" has been observed by all (100 percent) of ministries. The only tool for meeting this was e-mail. Furthermore, sub-dimension "domain data acquisition" has not suitable state in Iranian ministries' portals because none of its features has been considered in eight ministries.

Q3: What is the status of knowledge transfer in Iran e-government portals?
This question is the last sub-question in KM mechanisms. We use 22 features to survey knowledge transfer in Iran e-government portals. Our findings are included in Table IV.

As can be seen from the table, the maximum score is 39 for resource sharing and after it the information alert has 38.5 percent of our features. The minimum score is 5 percent for online collaboration. Totally, 22 percent of knowledge transfer features were found to be available in Iran e-government portals. The results generally showed that these portals are very poor in this knowledge mechanism. In addition, analysis of the findings demonstrates that sub-dimension "online collaboration" has not been considered by 15 ministries and it has been observed more (50 percent) in the Ministry of Economy and Finance Affairs. Sub-dimension "information alerts" has been considered more (57 percent) in the ministries of "Communication and Information Technology", "Economy and Finance Affairs", "Welfare and Social Security" and "Industries and Mines". "Information alerts" in Iranian ministries' portals is done using e-mail, and inclusion of what's news (recent news) and contact telephone or mobile numbers. Two other sub-dimensions namely "user support" and "resource sharing" were considered 13 and 50 percent in the portals studied, respectively.

After finding the score of knowledge mechanisms, we need to show the score of KM in Iran e-government portal. Indeed, the mean of total score of all KM mechanisms is the rate of KM features considered in Iran e-government portals. Table V shows the findings of KM mechanisms.

As the table demonstrates, the maximum score for the knowledge mechanism was 30 for knowledge creation. The mean score for KM in Iran e-government portals was 26

Knowledge creation dimensions (%)			
User information acquisition	Feedback	Domain data acquisition	Total mean (%)
37.5	100	20	30

Table III. Knowledge creation dimensions mean scores

Knowledge transfer dimension (%)				
Online collaboration	Information alerts	User support	Resource sharing	Total mean (%)
5	38.5	13	39	22

Table IV. Knowledge transfer dimensions mean scores

	KM mechanisms (%)		
Knowledge access	Knowledge creation	Knowledge transfer	Total mean (%)
26.4	30	22	26

Table V. KM mechanisms scores

percent. This percent showed that e-government portals in Iran are very poor. However, Table VI attempts to portray better identification of good and weak ministries in observing KM dimensions considered in the present study.

As can be seen in the table, in the field of "knowledge access" the ministry of "Communication and Information Technology" has had the best performance in observing the studied features with 41 percent, whereas the ministry of "Justice" with 13.6 percent has had a low performance. Also, in relation to "knowledge creation" and "knowledge transfer", the ministry of "Economy and Finance Affairs" has had a better performance than its colleagues with 66.7 percent and 41 percent, respectively. Overall, the ministries of "Economy and Finance Affairs" and "Industries and Mines" with 42 percent were the best doers in observing features defined in the study. It is notable that the weakest performance is of the ministry "Science, Research, and Technology" with 16 percent.

Concluding remarks and dos

As noted by Goh *et al.* (2008), KM is a crucial consideration in e-government portals to ensure that knowledge flows efficiently between governments, citizens and organizations. In this research, we have done an investigation into KM mechanisms in Iranian e-government portals. In our work, we used the K-ACT model to evaluate KM. The results showed that only 26.4 percent of knowledge access features were found to be available in Iranian e-government portals (see Table II). However, 22 percent of knowledge transfer features were found to be available in Iranian e-government portals (see Table IV). The mean score for KM in Iran e-government portals was 26 percent (see Table V). These results, generally, showed that KM is very poor in e-government portals in Iran and thus those responsible must consider some features in their decisions about portal design. This area requires further work, in particular in elaborating the relationship between e-government and KM.

According to the findings and some related studies (e.g. Choudrie *et al.*, 2004) some considerations that Iran government and related parties can do to promote KM in e-government portals are put forward as following:

- Planning strategically with key experts to design new model for adoption of KM in e-government. These experts can be computer specialists, knowledge managers, librarians, portal designers and users of portals.

- The Iranian government needs to consider issues such as compatibility of objectives, resources, types of services, and organizational cultures, because different interests may require different KM practices.

- Efficient as well as useful communication between government and citizens is fundamental for developing successful KM partnerships.

- Web designers and policy makers responsible for e-government should follow and encourage the use of KM guidelines when designing web portals for e-government.

- More angles, such as layout, use of scripting languages, security of personal data and availability of citizen documentation, could be incorporated into e-government portals.

- The quality of portals is highly dependent upon the end-users; hence, their point of views about e-government portals can have an influential impact on portals' quality and promote it provided that their voice is heard and implemented in practice.

KM (sum of three dimensions)		Knowledge transfer		Dimensions studied Knowledge creation		Knowledge access	
Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest
"Economy and Finance Affairs" and "Industries and Mines" (42 percent)	"Justice" and "Science, Research, and Technology" (16 percent)	"Economy and Finance Affairs" (41 percent)	"Petroleum", "Science, Research, and Technology", "Justice", "Foreign Affairs", and "Roads and Transportation" (13.6 percent)	"Economy and Finance Affairs", "Health and Medical Education", "Industries and Mines", and "Defense and Logistics" (66.7 percent)	"Education", "Foreign Affairs", "Agricultural Jihad", "Science, Research, and Technology", "Labor and Social Affairs" and "Petroleum" (16.7 percent)	"Communication and Information Technology" (41 percent)	"Justice" (13.6 percent)
"Communication and Information Technology" (34 percent)	"Petroleum" and "Foreign Affairs" (18 percent)	"Industries and Mines" (36.4 percent)				"Industries and Mines" (41 percent)	"Commerce" (18.1 percent)
"Health and Medical Education", "Cooperatives", and "Welfare and Social Security" (32 percent)	"Commerce" and "Energy" (20 percent)	"Welfare and Social Security" (31.8 percent)				"Economy and Finance Affairs" (36.4 percent)	"Science, Research, and Technology", "Labor and Social Affairs" and "Energy" (18.1 percent)

Table VI.
Performance of Iranian ministries in observing KM dimensions

Additionally, as mentioned earlier, the Iranian government has paid a considerable budget for the promotion of e-government but the result is not seemingly satisfactory. It should be accepted that budget is only one of five factors affecting the development of information technology. Other factors including "infrastructure", "human resources", "government's will and motivation", and "laws and regulations" (Secretary of High Council of Informatics, 2002) should be considered in theory and practice. It should not be neglected that hastiness in the implementation of policies or decisions must be avoided because it can hinder the efficiency and effectiveness of finished products. It is important to remember that more interaction between Iranian ministries in qualifying their portals and particularly making use of experiences of better Ministries in meeting KM mechanisms (e.g. the ministries of "Economy and Finance Affairs", "Industries and Mines", and "Communication and Information Technology" seems to be constructive. As Xiong's (2006) study (quoted in Kulcu, 2009, p. 1006) in China revealed, it is considered necessary for the developing countries (like Iran, Turkey (Kulcu, 2009), and South Africa (Mutula and Mostert, 2010)) to concentrate more on the efforts notably towards raising the awareness on e-government applications and the intensification of their use. Besides, inter-institutional coordination is also one of the priorities to be dealt with.

Practical implications that have been here discussed are some about KM in Iranian e-government portals. Generally, the government in Iran, considering the crucial role of KM in the area e-government, must use a KM approach to improve the current situation of its e-government portals. Additionally, according to Lee *et al.* (2008), greater effort should be made for advanced functions, viz. disability access, privacy and security and advertisement and user pay system. Functionality in e-government portals can be also considered in future studies. As a closing remark, it is worth restating the useful as well as strategic saying of Norris and Moon (2005, p. 72):

> E-government is continually evolving. As many practitioners have said, e-government is a moving target. For this and other reasons, it is important that research continues to explore e-government adoption and impacts, particularly with longitudinal data from all levels of government as well as in-depth case studies of e-government initiatives. Continued research needs to keep pace with the practice and to gauge impacts of this dynamic, innovative, and relatively new IT, which, according to many, has such great potential to transform government service delivery and the very face of government itself.

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Appendix

URL	Ministry
www.medu.ir	Education
www.ict.gov.it	Communication and Information Technology
–	Intelligence
www.mefa.gov.ir	Economy and Finance Affairs
www.mfa.gov.ir	Foreign Affairs
www.moc.gov.ir	Commerce
www.mohme.gov.ir	Health and Medical Education
www.icm.gov.ir	Cooperatives
www.agri-jahad.ir	Agricultural Jihad
www.justice.ir	Justice
www.mod.ir	Defense and Logistics
www.mrt.ir	Roads and Transportation
www.refah.gov.ir	Welfare and Social Security
www.mim.gov.ir	Industries and Mines
www.msrt.gov.ir	Science, Research, and Technology
www.ershad.gov.ir	Culture and Islamic Guidance
www.irimlsa.ir	Labor and Social Affairs
www.moi.ir	Interior
www.mhud.gov.ir	Housing and Urban Development
www.nioc.org	Petroleum
www.moe.org.ir	Energy

Table AI.
Iranian e-government
portals studied

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