Evaluating ICT Accessibility in Qatari Public Institutions: The Role of the MARSAD Tool in Fostering Inclusion and Sustainability

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Abstract- Technology has made social inclusion possible for people with disabilities worldwide. It ensures access to media, education, employment through assistive technology. To create inclusive policies and laws, decision makers must understand ICT products and services, their compliance with international accessibility requirements, and their use in the country. This study presents MARSAD, an e-readiness assessment instrument developed and implemented by Mada Center to discover factors that influence ICT accessibility for persons with disabilities living in the State of Qatar. It measures the national ICT accessibility adoption rate and makes recommendations to increase digital access for government and semi-government organisations' digital platforms. 14 educational and cultural institutions used the tool. Participating institutions have significant ICT infrastructure gaps to provide an inclusive digital environment, which is in line with sustainability and SDG 11, to make cities and human settlements inclusive, safe, resilient, and sustainable. Based on MARSAD outcomes, member institutions were willing to invest in making improvements. The method can be used as a basis for e-readiness assessment studies to provide accessible ICT products and services for persons with disabilities and the elderly.

Keywords- Inclusion and disability; digital transformation; inclusive society; e-readiness assessment; ICT accessibility; digital accessibility; policy adoption rate.

1. Introduction

The UN Convention for the Rights of Persons with Disabilities (UNCRPD) states that the provision of accessible ICT is a fundamental obligation for all State parties (Ferreras et al. 2017). It is important to ensure that the needs of persons with disabilities are met in a sustainable manner and that the provision of accessible ICT can contribute to achieving the Sustainable Development Goal 11 (Oncins 2020). Qatar has been taking steps to make technology accessible for all, ranking first worldwide in the Digital Access Rights Evaluation Index (DARE Index). This study considered country laws and regulations and the country's ability to implement existing ICT access programs and policies (Qatar - G3ict: The Global Initiative for Inclusive ICTs n.d.). The DARE Index conducted in 2020 identified 137 countries from the 182 State Parties to the UNCRPD in eight regions.

Qatar ranked second highest among Arab countries and 38th worldwide in the Network Readiness Index. The digital divide, which refers to the unequal access and utilization of technology between different populations, is a pressing sustainability issue. Mada designed and implemented an ICT Accessibility Adoption Rate (MARSAD) to measure the adoption rate of accessible ICT and develop key recommendations to improve digital access (Othman et al.

2023). The primary focus area requiring enhancement was to enable persons with disabilities through ICT within the domains of education, community, and culture in addition to the measure the impact on the Elderly as an indirect-goal (Al-Thani et al. 2022). MARSAD is a tool focused on ICT accessibility standards that facilitate ICT adoption by organizations and institutions in Qatar.

Qatar is committed to maximizing Internet utilization and has an Internet penetration rate of 94% (QATAR'S ICT LANDSCAPE 2019 n.d.). This paper discusses the factors that influence the adoption of ICT accessibility and the importance of having an e-readiness tool to measure digital accessibility. Our study focuses on the adoption of ICT accessibility for persons with disabilities and the factors that influence this adoption. MARSAD is an e-readiness assessment tool that measures the national ICT accessibility adoption rate and provides key recommendations for improving digital access. It can serve as a foundation for future e-readiness assessment studies.

2. The E-Readiness Concept and E-Readiness Assessment Tools

E-readiness is a concept that measures the capacity of nations to participate in the digital economy and leverage digital channels for communication, commerce, and government. It is also measured as a community's relative advancement in the most critical areas for ICT adoption and the essential applications of ICTs. E-readiness can be explained as the nations' readiness or the ability of organizations to provide access to inclusive and accessible ICT digital platforms suitable for use by persons with disabilities. This definition of e-readiness can be categorized to impact both social welfare and economic factors (Lahiri 2021). E-Readiness Assessment Initiatives and Tools are essential for governments and policymakers to understand the state of ICT infrastructure, access, and services within a country (Metaxiotis, Larios, and Assimakopoulos 2010).

These assessments measure various aspects of ICT, society, and the economy, and can provide governments and policymakers with vital information to develop impactful national ICT strategies and improve specific aspects of e-readiness. The maximum potential of ICT usage can be achieved by acquiring a high degree of e-readiness, which reflects the country's ability to provide accessible ICTs to the population, the effectiveness of the implemented legal and regulatory ICT framework, and progress related to ICT-driven projects and initiatives. E-readiness assessment tools are designed to measure ICT utilization and penetration among communities, organizations, and populations. They can be classified into e-society and e-economy, with e-society focusing on social welfare and e-economy focusing on e-business, e-commerce, and ICT infrastructure.

The results of DARE Index revealed the need to measure the ICT adoption rate among various institutions in Qatar and develop recommendations to improve the state of digital inclusion. E-readiness tools exist in the modern world of ICT, and global companies have devised them to be easily used in grading exercises. Examples include the UN e-government publication and its grading by the Economic Intelligence Unit (EIU), the Centre for International Development (CID), and the Asia-Pacific Economic Cooperation (APEC) e-readiness results. The World Bank's Knowledge Assessment Methodology targets migration to knowledge-based communities. The Risk E-business Tool and Mosaic's Global Internet Diffusion Framework assess the nation's capacities to delve into digital economic activities.

The Information Society Index, Global Technology Index, and Index of ICT Diffusion all

assess the capacity of communities to remain digital despite the dynamicity of the global social and economic systems. The APEC E-Commerce Readiness Assessment Guide targets major businesses that drive the rising Asian economies. All three e-economy readiness assessment tools focus on exploring the critical infrastructure and state implementations of the latest technologies to ensure economic prosperity. The lack of inclusion in e-readiness assessment tools has led to the need for accessibility standards in digital platforms.

Most e-readiness assessment tools are meant to measure aspects such as policy making and national ICT development strategy impacts (Mutula 2009). Policymakers must be at the forefront of formulating guidelines to increase the magnitude of e-readiness measures to address the needs of persons with disabilities. E-readiness assessments provide policymakers with a model of the economy's competitiveness concerning ICT performance, but have yet to emphasize social inclusion factors such as the challenges facing people with disabilities in accessing information and communication technologies. Accessible ICT includes the availability of an ICT infrastructure that incorporates the relevant accessibility standards. Nations need to acquire optimal e-readiness to accommodate the adequate availability of ICT and related services for persons with disabilities.

3. The E-Readiness Assessment Framework “MARSAD” by Mada

The MARSAD e-readiness assessment framework is grounded in factors related to implementing ICT infrastructure and policies (Othman et al. 2023). It is part the ecosystem “Mada Innovation Program” that aims to increase the number of the digital accessibility solutions and innovative assistive technology (Al-Thani et al. 2019). It identifies 13 critical components of the E-Readiness Assessment related to implementing an accessible ICT ecosystem based on the research outcome of Averweg in 2009. Additionally, it identifies policies, processes, and standards necessary to implement these e-readiness assessment components effectively. Finally, ten outcome indicator areas that will be impacted because of adequate provision of accessible ICT have been included in the framework. These outcome indicators include web, TV and multimedia, mobile telephony, e-books, and digital contents, Internet availability and usage among persons with disabilities, inclusive ICTs for all in education, enabling ICTs for all in employment, e-government, and smart cities for all, enabling assistive technologies and ICTs for independent living, and procurement of accessible public goods and services for all citizens. The web part is monitored through the Mada Web Accessibility Monitor (Al Jabor et al. 2021). Here are the 13 critical components of the E-Readiness Assessment related to accessibility:

- Government: plays a key role in successful ICT adoption by funding the development, maintenance, and improvement of national ICT infrastructure. Pro-active government investments in the implementation and regulation of ICT infrastructure and services can lead to early adoption and high levels of e-readiness.

- Policy and regulations are essential for achieving a digital economy. They reduce barriers such as cost, access, and capacity, and provide diversified business opportunities. An overarching policy is necessary to coordinate and harmonize the ICT direction across all sectors. Additionally, ICT accessibility must be made accessible to persons living with disabilities.

- Internet and public access are essential for accessing information and communication services and e-commerce services, and public Internet access enables more significant

ICT usage. Equitable access to information, communication, and government services is essential for digital economies.

- Hardware and software industries are essential for building an ICT infrastructure, providing cutting-edge technologies and products and services to SMEs in the digital economy. National ICT policy and regulation frameworks need to provide an incentivized business ecosystem to achieve high levels of e-readiness.

- Telecommunications industries provides essential services to an ICT-based society and economy, as well as the global information infrastructure.

- Digital service providers: provide services over the Internet, support e-commerce features, and generate revenue for a digital economy.

- Information and Knowledge Management Systems provide access to appropriate information and knowledge is essential for traditional businesses to transition to e-businesses. Knowledge management systems are essential for businesses to operate successfully in a knowledge-based economy. Knowledge sharing is highly valued and is an essential element in competitions between public bodies.

- E-Business and E-Commerce Industry facilities allow businesses to communicate cost-effectively and transact with clients transparently, reducing customer response time and increasing customer satisfaction.

- Intellectual Property Rights are essential for SMEs to protect their ICT innovations and digital products, while also protecting and managing digital rights.

- Human Capital and Knowledge are important for SMEs to compete in international markets, and knowledge-based digital economies rely on human capital investment in knowledge workers to develop new designs, ideas, and innovations.

- Research and Development is essential for governments and economies to promote innovation and create new products and services. It requires networking mechanisms and knowledge exchange, as well as ICT business incubation centers and support services.

- Emerging Technologies: Nations must be involved in developing and early adopting emerging technologies to improve their efficiency and quality of products and services. Recent emerging technologies such as AI, VR, blockchain, and robotic process automation are widely used.

- Innovation and Entrepreneurship are used for a growing digital economy, and the success of the ICT industry relies on funding streams, community and market access, support for solution providers, effective policy and best practices, collaborations, networking opportunities, innovation and design capabilities, a strong private sector, informed decision-making, and improved delivery and capacity.

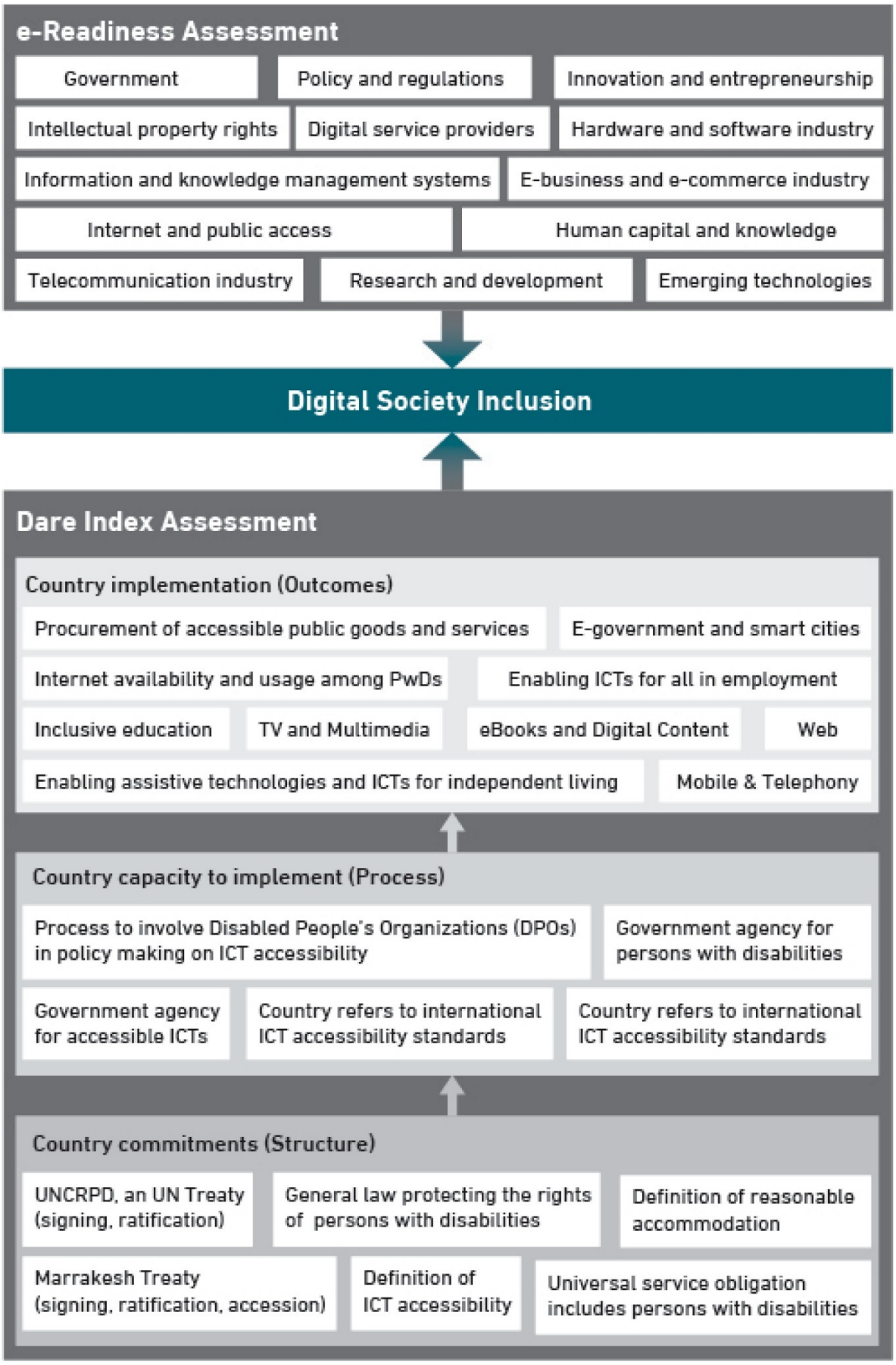

Figure 1. Overview of the e-readiness assessment framework

4. Theoretical Model

The MARSAD e-readiness tool was used to measure the state's ability of institutions in Qatar to provide accessible digital platforms for persons with disabilities [4]. The primary focus areas of ICT usage by persons with disabilities are within the domains of education, culture, and community. The study followed the socio-technical system (STS) theoretical framework to understand the factors influencing the adoption of ICT accessibility and to develop recommendations for improving digital access for persons with disabilities and providing recommendations for creating an inclusive and sustainable digital environment. As a first step, several focus groups were conducted to provide information about the institution's digital platforms and relevant e-government services most accessed/used by them and rate the impact of its access/usage availability on their quality of life. This study explores how a person with disability uses or will use digital platforms of the organization or/and use the available e-government services.

It suggests that two of the possible and immediate consequences of inadequate implementation of digital accessibility policy are the ignorance about the policy and the loss of control over how they develop and update their digital platforms. Additionally, two additional factors that may influence the engagement are the public relations and IT policy restrictions enacted as part of corporate governance and the inclination of individual employees to engage in implementing digital accessibility guidelines that transcend normative job-role requirements. The adapted theoretical model is presented in Figure 2.

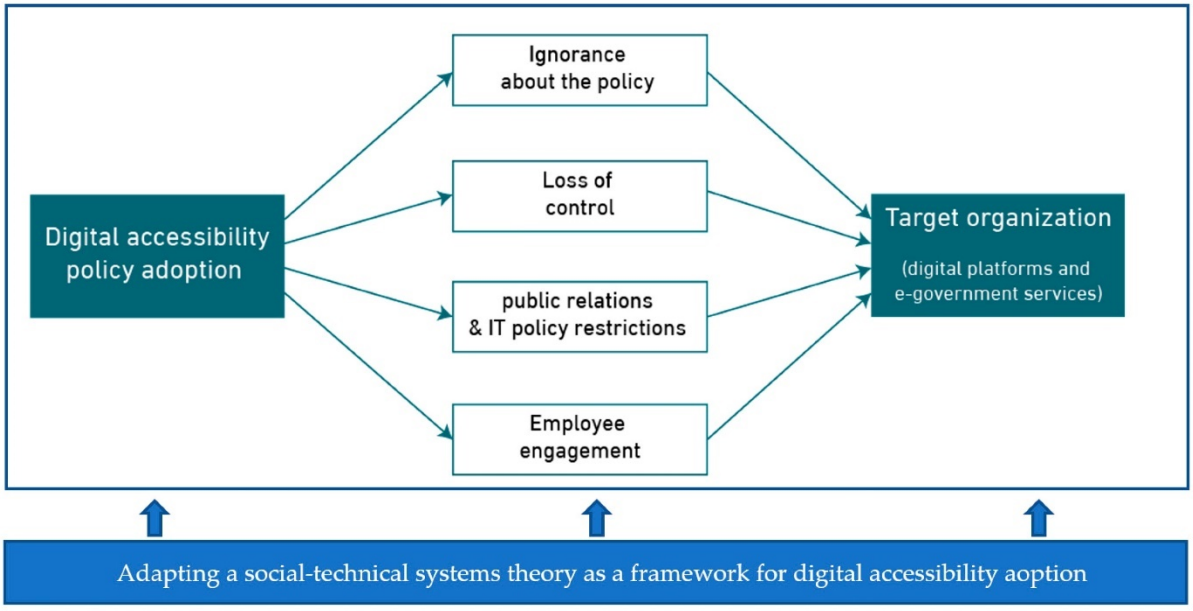

Figure 2. Adapted theoretical model based on socio-technical theory.

5. Overview of the results

The results of implementing MARSAD in 2019 Q2 and 2021 Q2 within participating institutions highlighted an improved state of ICT accessibility by reflecting higher scores during the second round of the survey implementation. The participating institutions can be distinguished into two groups. The first group consists of institutions that scored equal to or above the overall baseline during 2019 Q2 (Figure 3). Their scores reflected that they were

already committed to providing accessible ICT by implementing some related policies and procedures. Participating institutions belonging to this group attained considerably higher scores while implementing the tool in 2021 Q2 and thus, offering an excelled quality of ICT accessibility services within the institution.

The second group comprises institutions that scored significantly below the overall baseline in 2019 Q2 (Figure 4), and the scores achieved by them indicated that they did not have any current policies or procedures for providing inclusive ICT access. However, these institutions also attained comparatively higher scores during the second round of implementation in 2021 Q2. They improved the provision of accessible ICT platforms and services within the institutions. After implementing the first round during 2019 Q2, all participating institutions were provided with recommendations and staff training to offer accessible ICT platforms and services. These activities have received positive feedback from all the institutions. It was observed that the primary factors influencing the provision of institutional accessible ICT services were gaining awareness, receiving appropriate ICT accessibility advice, and technical knowledge among relevant staff members to implement inclusive ICT services. It was noticed that many of the participating institutions in Group 2 were vaguely aware of the concept of ICT accessibility. These institutions gained awareness about the concept while working to implement the tool, which initiated their interest in providing accessible ICT for all users. It was complemented by the advice and training offered to them after the initial round in 2019 Q2, which led them to have an improved capacity to deliver accessible ICT services.

Based on this study, there are several key elements that are necessary for achieving the successful provision of accessible ICT. These elements include:

- A clear understanding of the needs and requirements of users with disabilities: In order to provide accessible ICT, it is essential to have a deep understanding of the specific needs and requirements of users with disabilities. This could include understanding the different types of disabilities and how they impact a person's ability to access and use ICT, as well as consulting with users with disabilities to gather input and feedback on their experiences and needs;

- Adoption of accessibility standards and guidelines: To ensure that ICT is accessible to users with disabilities, it is important to adopt and adhere to relevant accessibility standards and guidelines. These standards and guidelines provide a framework for designing and developing accessible ICT, and can help ensure that the technology is usable and accessible to all users;

- Training and support for users with disabilities: Providing accessible ICT is not just about the technology itself, but also about ensuring that users with disabilities have the necessary training and support to use the technology effectively. This could include providing training on how to use the technology, as well as ongoing support and assistance to help users with disabilities to overcome any barriers or challenges they may encounter;

- Ongoing evaluation and improvement: Providing accessible ICT is an ongoing process, and it is important to regularly evaluate and improve the technology to ensure that it continues to meet the needs of users with disabilities. This could include conducting user testing and feedback sessions, as well as staying up-to-date on the latest accessibility standards and guidelines, to ensure that the technology remains accessible and usable for all users.

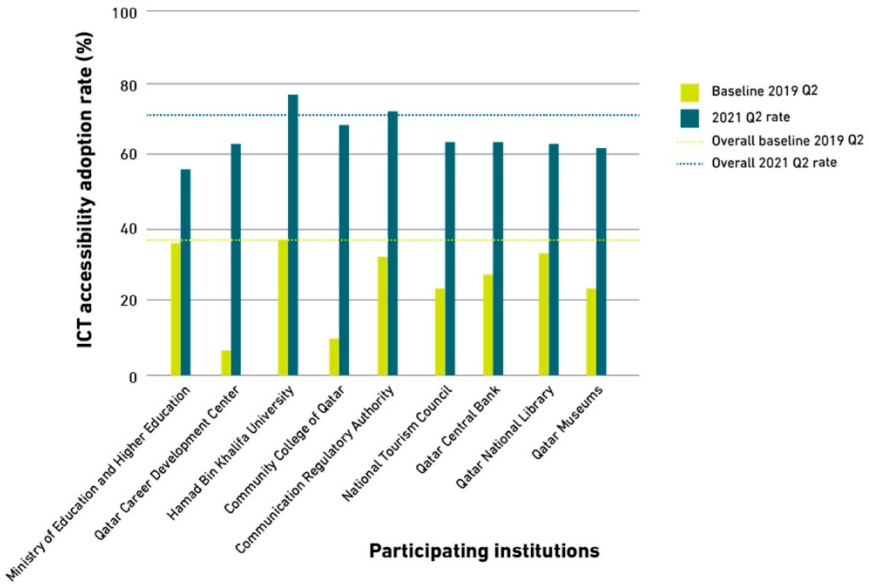

Figure 3. Group 1—participating institutions that scored above the overall baseline in 2019 Q2 and already had current policies and procedures in place to provide accessible ICT.

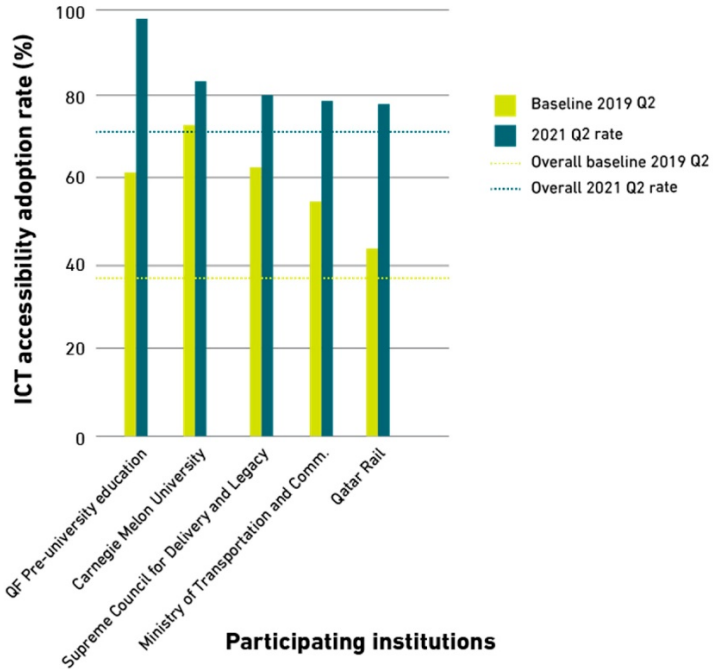

Figure 6. Group 2—participating institutions that scored below the overall baseline in 2019 Q2 and did not have policies and procedures in place to provide accessible ICT.

6. Conclusion and future directions

The e-readiness assessment tool (MARSAD) measures the utilization of accessible ICT in various domains and identifies gaps in the ICT infrastructure of government and semi-government institutions in Qatar. The results of the assessment show a genuine willingness to invest in implementing the required changes. MARSAD was effective in capturing data about the overall state of ICT accessibility in the participating organizations and provided decision-

makers with the necessary information to take action to improve the accessibility of ICT platforms and services offered by the organizations. It is designed to be used within an environment where the ICT accessibility ecosystem is in its infancy. The absence of an ICT accessibility readiness tool can be difficult for organizations to assess and evaluate their current level of accessibility.

This can lead to a lack of progress in making ICT accessible and a suboptimal user experience for individuals with disabilities. Mada Center will provide the necessary support to empower organizations in Qatar and the Arab region to make the shift towards a digital ecosystem accessible to all. Extending the study to additional domains could offer new perspectives on the results of the research.

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