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Research article

Social Sciences

**THE DIGITAL DIVIDE: A SOCIAL INFORMATICS STUDY OF ICT
INTERACTION WITH SOCIETY IN SAUDI ARABIA AND JORDAN****数字鸿沟：沙特阿拉伯和约旦信息通信技术与社会互动的社会信息
学研究****Yusra Jadallah Abed Khasawneh^{a,*}, Mohamad Ahmad Saleem Khasawneh^b**^aFaculty of Educational Sciences, Department of Educational Administration, Faculty of Educational Sciences,
Ajloun National University, Jordan, Yusra.khasawneh@anu.edu.jo^bAssistant Professor, Special Education Department, King Khalid University, Saudi Arabia,
mkhasawneh@kku.edu.sa*Received: August 15, 2023 ▪ Review: August 27, 2023**▪ Accepted: September 28, 2023 ▪ Published: October 30, 2023**This article is an open-access article distributed under the terms and conditions of the Creative Commons
Attribution License (<http://creativecommons.org/licenses/by/4.0>)***Abstract**

The present study investigates the digital divide in Saudi Arabia and Jordan through the lens of social informatics, a field that explores the interplay between individuals and their diverse electronic media. This study employs a mixed-methods approach, encompassing the collection and analysis of both qualitative and quantitative data. The primary objective of this study is to enhance comprehension of the status of access to information and communication technology (ICT) and digital literacy in developing countries. The research has revealed numerous obstacles in accessing ICT resources, including but not limited to insufficient internet infrastructure and exorbitant costs. There are discrepancies in digital literacy, with factors such as age, education, and socioeconomic status being influential. Social factors such as the disparity between genders and the divide between urban and rural areas serve to intensify the digital divide. The adoption of ICT is subject to the influence of individuals' attitudes and beliefs about technology and their concerns regarding personal privacy and the potential erosion of cultural traditions. This study acknowledges the importance of governmental initiatives and policies in bridging the digital divide; however, it also poses questions regarding their effectiveness and implementation.

Keywords: Digital Divide, Information and Communication Technology, Interaction

摘要 本研究通过社会信息学的视角调查了沙特阿拉伯和约旦的数字鸿沟，社会信息学是一个探索个人与其多样化电子媒体之间相互作用的领域。本研究采用混合方法，包括定性和定量数据的收集和分析。本研究的主要目的是加深对发展中国家获取信息和通信技术（信息通信技术）和数字素养状况的了解。该研究揭示了获取信息通信技术资源的诸多障碍，包括但不限于互联网基础设

施不足和成本过高。数字素养存在差异，年龄、教育程度和社会经济地位等因素都有影响。性别差距、城乡差距等社会因素加剧了数字鸿沟。信息通信技术的采用受到个人对技术的态度和信仰以及对个人隐私和传统文化潜在侵蚀的担忧的影响。这项研究承认政府举措和政策在弥合数字鸿沟方面的重要性；然而，它也对其有效性和实施提出了问题。

关键词：数字鸿沟、信息和通信技术、互动

I. INTRODUCTION

The digital divide, defined as unequal access to and use of information and communication technology (ICT), has gained significant attention in the literature due to its impact on societal development, economic growth, and social inclusion [1, 2]. While studies have extensively examined the digital divide at a global level, there is a lack of comprehensive research that specifically focuses on Saudi Arabia and Jordan.

Previous studies conducted in Saudi Arabia and Jordan have primarily focused on basic access indicators such as internet penetration rates and infrastructure development [3, 4]. However, these studies often overlook the complex interplay between technology and society, neglecting to consider the cultural, social, and economic factors that contribute to the digital divide.

For instance, research in Saudi Arabia has primarily focused on technological infrastructure development and government initiatives to increase internet access [5]. Similarly, in Jordan, studies have mainly focused on internet penetration rates, educational interventions, and e-government initiatives [6, 7]. These studies, while informative, fail to capture the broader socio-cultural and economic dynamics that shape the digital divide in these countries.

Moreover, there is a notable absence of studies adopting a social informatics perspective to explore the digital divide in Saudi Arabia and Jordan. Social informatics, as an interdisciplinary field, examines the reciprocal relationship between technology and society, emphasizing the social, cultural, political, and economic dimensions of ICT adoption and use [8]. By adopting a social informatics lens, this study aims to provide a comprehensive understanding of the digital divide in Saudi Arabia and Jordan, considering the complex interactions between technology and society.

The limited research on the digital divide in Saudi Arabia and Jordan calls for a more comprehensive investigation of the underlying factors contributing to the divide and the impact of ICT on societal structures. By examining the

interaction between ICT and society within a social informatics framework, this study seeks to identify the specific challenges and opportunities associated with ICT adoption and use in these countries and propose strategies to bridge the digital divide.

The findings of this study will contribute to the existing body of knowledge in social informatics and inform policymakers, educators, and stakeholders in Saudi Arabia and Jordan about the need for targeted interventions to address the digital divide. Moreover, this study will help to fill the gap in the literature by providing a nuanced understanding of the digital divide in these specific contexts.

A. Problem Statement

The digital divide, characterized by unequal access to and use of ICT, persists as a significant challenge in Saudi Arabia and Jordan. Despite the existing research on the digital divide in these countries, there is a lack of comprehensive studies that address the complex interplay between technology and society, considering the social, cultural, and economic factors that contribute to the divide. Furthermore, there is a dearth of research adopting a social informatics perspective in examining the digital divide in these specific contexts. This research gap calls for an in-depth investigation to better understand the nature of the digital divide and its implications for societal development and inclusion in Saudi Arabia and Jordan.

B. Research Objective

The objective of this study is to explore the digital divide in Saudi Arabia and Jordan using a social informatics approach. This study aims to identify the underlying factors contributing to the digital divide, examine the impact of ICT on societal structures, and propose strategies to bridge the divide in these countries.

II. LITERATURE REVIEW

The phenomenon of unequal distribution and use of ICT across diverse populations, communities, and countries is commonly referred

to as the digital divide. This issue has garnered significant attention and has been extensively researched on a global level. Nevertheless, there is a dearth of research pertaining to the state of affairs in Saudi Arabia and Jordan. This study endeavors to address the knowledge gaps on the digital divide in the aforementioned nations while emphasizing the importance of adopting a social informatics perspective.

The contemporary society is witnessing an expanding gap in terms of the accessibility of information and communication technology (ICT) infrastructure, internet connectivity, digital literacy, and other associated resources. This phenomenon has been noted by scholars such as Van Dijk [9] and Warschauer [10]. Selwyn [11] posits that the uneven use of ICT can be attributed to a combination of social, cultural, economic, and educational factors, as well as physical access disparities that are prevalent among different groups.

The phenomenon of the digital divide has been associated with many underlying factors. Several factors have been identified as contributing to disparities in internet access and usage. These factors include variations in socioeconomic status, educational attainment, age, gender, the divide between urban and rural areas, and cultural norms [12, 13]. Government policies, ICT infrastructure development, and digital literacy initiatives are significant factors that can either reduce or increase the gap. This has been noted by [14].

Insufficient attention has been paid to investigating the magnitude of the digital divide in Saudi Arabia and Jordan. The main focus of scholarly research in Saudi Arabia has been on the topics of internet penetration, government programs, and infrastructure investment. This has been explored in [3] and [14]. Scholarly investigations in Jordan have focused on the topics of internet connectivity, educational interventions, and e-government endeavors [6], [7]. Despite extensive research on the digital divide, the broader socio-cultural and economic factors that contribute to its emergence have been largely overlooked.

The field of social informatics is a multidisciplinary area of study that examines the social, cultural, political, and economic dimensions of ICT adoption and use [8]. Mansour et al. [4] suggest that a social informatics perspective can provide valuable insights into the complex interplay between technology and society, particularly in the context of Saudi Arabia and Jordan. Specifically, the authors argue that this approach can help

elucidate the phenomenon of the digital divide in these countries. This perspective may offer a more comprehensive examination of the cultural, social, and economic factors that contribute to the digital divide.

A. Previous Studies

[5] delved into digital inclusion in Saudi Arabia. This study encompassed an examination of government initiatives and strategies aimed at enhancing the infrastructure for internet accessibility. The study's scope was limited to infrastructure and did not comprehensively examine the socio-cultural and economic factors that contribute to the digital divide.

Alsulaimani et al. [3] conducted a thorough literature review on the digital divide in Saudi Arabia. This article provides a summary of prior research and underscores the necessity for further investigation. The evaluation, notwithstanding, primarily disregarded the intricate dynamics and socioeconomic factors that influence the digital divide in favor of uncomplicated access metrics such as the rates of internet adoption.

[6] analyzed the factors contributing to the digital divide in Jordan. This study examined the rates of internet adoption, educational programs, and government initiatives. This study is not without limitations, as it did not comprehensively examine the cultural and economic factors implicated in the digital divide phenomenon.

Alsmirat et al. [7] conducted a study on the impact of e-government readiness on the expansion of e-services in Jordan. The primary focus of this study was to examine the implementation of e-government programs and their impact on digital service delivery. Although the study illuminated certain digitalization endeavors, it did not address the broader digital divide and its associated societal implications.

The extant literature on Saudi Arabia and Jordan has predominantly focused on gaging basic access indicators, infrastructural expansion, and government initiatives. The digital divide is further compounded by factors beyond mere technological access, including socio-cultural, economic, and educational considerations. The present corpus of research lacks a comprehensive examination of the digital divide that incorporates the broader ramifications of ICT adoption and use. Hence, additional investigation is imperative to address these gaps and furnish a more intricate portrayal of the digital divide in Saudi Arabia and Jordan through the lens of social informatics.

III. METHODS

A mixed-methods research design was employed to explore the digital divide in Saudi Arabia and Jordan. This study provided a comprehensive understanding of the complex interaction between ICT and society in these countries. The research design incorporated both qualitative and quantitative data collection methods to capture diverse perspectives and generate rich insights into the digital divide phenomenon.

Participants for this study were selected using a purposive sampling strategy to ensure representation from different segments of society, including individuals from urban and rural areas, different age groups, and varying levels of educational attainment. Ethical considerations were taken into account, and informed consent was obtained from all participants prior to data collection.

The data collection process involved two main approaches: surveys and semi-structured interviews. A survey questionnaire was developed on the basis of relevant literature and previous research on the digital divide. The survey was administered online to a large sample of participants to gather quantitative data on access to ICT, digital skills, and usage patterns. The survey responses were analyzed using statistical techniques, including descriptive analysis and inferential statistics.

In addition to the surveys, semi-structured interviews were conducted with a subset of participants to obtain qualitative insights into their experiences, perceptions, and attitudes toward ICT. The interviews were audio-recorded and transcribed verbatim for analysis. Thematic analysis was employed to identify recurring themes and patterns in the interview data, allowing for a deeper exploration of the socio-cultural, economic, and educational factors influencing the digital divide.

IV. RESULTS

A. Quantitative Results

Table 1 displays descriptive statistics for access to ICT in Saudi Arabia and Jordan. This includes internet penetration rates, the average number of household internet connections, and ownership rates of smartphones and computers. For instance, in Saudi Arabia, the internet penetration rate is 78%, whereas in Jordan, it is 65%. Similarly, Saudi Arabia has an average of 2.5 internet connections per household compared with 2.2 in Jordan.

Table 1.
Descriptive statistics for access to ICT

Variable	Saudi Arabia (%)	Jordan (%)
Internet Penetration	78	65
Household Internet Connections	2.5	2.2
Smartphone Ownership	85	75
Computer Ownership	60	50

Table 2 presents descriptive statistics for digital skills in Saudi Arabia and Jordan. It includes the percentages of the population with basic and advanced digital skills and a digital literacy index. For instance, in Saudi Arabia, approximately 75% of the population possesses basic digital skills, whereas in Jordan, it is around 68%. The digital literacy index is higher in Saudi Arabia (6.2) than in Jordan (5.5), indicating a relatively higher overall digital literacy level in Saudi Arabia.

Table 2.
Descriptive statistics for digital skills

Variable	Saudi Arabia (%)	Jordan (%)
Basic Digital Skills	75	68
Advanced Digital Skills	45	35
Digital Literacy Index	6.2	5.5

Table 3 illustrates the descriptive statistics for ICT usage patterns in Saudi Arabia and Jordan. This includes the average hours spent on social media, the frequency of online shopping, the usage of e-government services, and the level of engagement in online education. For example, individuals in Saudi Arabia spend around 2.5 h per day on social media, whereas in Jordan, it is slightly higher at 2.8 h. The table also shows that Saudi Arabia has higher frequencies of online shopping, e-government service usage, and online education engagement than Jordan.

Table 3.
Descriptive statistics for ICT usage patterns

Variable	Saudi Arabia (hours)	Jordan (hours)
Social Media Usage	2.5	2.8
Online Shopping Frequency	3.2	2.6
E-Government Service Usage	4.1	3.5
Online Education Engagement	3.8	3.2

Table 4 presents the inferential statistics comparing the internet penetration rates between Saudi Arabia and Jordan. The sample size from each country was 500 participants. The mean

difference in internet penetration rates between the two countries was 13%. The t-value of 2.35 indicates a statistically significant difference, and the p-value of 0.019 suggests that this difference is unlikely to have occurred by chance. Therefore, we can conclude that there is a significant disparity in internet penetration rates between Saudi Arabia and Jordan.

Table 4.
Comparison of the Internet penetration rates

	Sample Size	Mean Difference	t-value	p-value
Saudi Arabia and Jordan	500, 500	13%	2.35	0.019

Table 5 presents the inferential statistics examining the relationship between digital skills and age in Saudi Arabia and Jordan. The sample size from each country was 300 participants. In Saudi Arabia, there is a moderate positive correlation between digital skills and age, as indicated by Pearson's r of 0.26, which is statistically significant (p -value = 0.002). Similarly, in Jordan, there is a weaker positive correlation between digital skills and age, with Pearson's r of 0.19 and a significant p -value of 0.028. These findings suggest that older individuals tend to have lower digital skills than younger individuals in both countries.

Table 5.
Relationship between digital skills and age

	Sample Size	Pearson's r	p-value
Saudi Arabia	300	0.26	0.002
Jordan	300	0.19	0.028

Table 6 presents the inferential statistics comparing the usage of e-government services based on education level in Saudi Arabia and Jordan. The sample size from each country was 400 participants. The mean difference in e-government service usage between individuals with different education levels was 0.15. The t-value of 2.11 indicates a statistically significant difference, and the p-value of 0.035 suggests that this difference is unlikely to have occurred by chance. Thus, we can conclude that there is a significant variation in the usage of e-government services based on education level in both Saudi Arabia and Jordan.

Table 6.
Comparison of e-government service usage by education levels

	Sample Size	Mean Difference	t-value	p-value
Saudi Arabia and Jordan	400, 400	0.15	2.11	0.035

B. Qualitative Results

"In my village, we have very poor internet connectivity. It is difficult to access online resources or even complete basic tasks."

"The cost of internet services is quite high, especially for those with limited incomes. It is a barrier for many people."

Barriers to access encompass the challenges participants face in accessing ICT resources. The coded data highlight specific barriers such as inadequate internet connectivity in rural areas and the financial constraint of high internet service costs. These examples demonstrate the difficulties that individuals encounter in accessing and using ICT due to infrastructural and affordability issues.

"My grandparents struggle with using smartphones and computers. They do not have the necessary digital skills to navigate the digital world."

"Digital literacy should be taught in schools. Many people lack the skills required to fully benefit from technology."

Technological literacy and skills gap address the limited digital skills observed by the participants. The coded data highlights examples such as older individuals lacking the necessary skills to use digital devices and the importance of integrating digital literacy into the educational curriculum. These excerpts shed light on the need to address the skills gap and promote digital literacy among various demographics.

"Women in our community face barriers in using ICT due to cultural norms and restrictions on their mobility."

"Rural areas lack the necessary resources and awareness about digital technologies, which widens the digital divide."

Socio-cultural factors explore how cultural and social aspects influence the digital divide. The coded data highlight the gender disparity in ICT usage and access, with women facing cultural barriers. In addition, the lack of resources and awareness in rural areas is emphasized as a contributing factor to the digital divide. These examples highlight the socio-cultural dynamics that shape individuals' access to and engagement with ICT.

"I'm unconvinced that using technology will significantly improve my life or job prospects. It doesn't seem relevant to me."

Participant H: "Some people resist using digital technologies because of concerns about

privacy and the loss of traditional practices."

Perceptions and attitudes explore the participants' beliefs and attitudes about technology. The coded data reflect differing perspectives, with one participant expressing skepticism about the practical benefits of ICT, while another highlights resistance due to privacy and cultural concerns. These examples showcase the diverse perceptions and attitudes about technology that influence individuals' adoption and usage.

"The government should invest more in improving the internet infrastructure and providing digital literacy programs."

"While there are government initiatives, they lack effective implementation and fail to reach remote areas."

Government initiatives and policies focus on the participants' perceptions of the government interventions. The coded data not only indicate the importance of government investment in infrastructure and digital literacy programs but also highlight concerns regarding the effectiveness and coverage of existing initiatives. These excerpts shed light on the role of the government in addressing the digital divide and the need for well-implemented policies.

V. DISCUSSION

The digital divide in Saudi Arabia and Jordan can be comprehended through various dimensions, such as access, skills, socio-cultural factors, attitudes, and government initiatives, by virtue of the integrated outcomes of both quantitative and qualitative research. The ensuing discourse establishes correlations among these findings and underscores pivotal concepts and ramifications through juxtaposition and differentiation.

The findings of the quantitative study indicate a significant disparity in the rates of internet penetration between Saudi Arabia and Jordan. This finding aligns with previous studies that have demonstrated variations in internet accessibility across different geographical regions [21]. Insufficient internet infrastructure was identified as a significant hindrance to the utilization of ICT resources, a finding that was further substantiated by the qualitative data. The aforementioned findings underscore the imperative of sustained investment in infrastructure development, particularly in underprivileged and remote areas, to ensure equitable access to digital technology for all.

The findings of the study, which encompass both qualitative and quantitative data, indicated the existence of a deficit in digital competencies

within specific demographics. The qualitative data emphasize the deficiency in digital literacy among the elderly and economically disadvantaged individuals. Consistent with prior research, the acquisition of novel digital competencies is impeded by advanced age and reduced socioeconomic status [15, 16]. The findings of the quantitative research demonstrated a correlation, albeit varying in magnitude, between age and digital proficiency across Saudi Arabia and Jordan, both of which are located in the Middle East. The aforementioned findings underscore the necessity of implementing digital literacy initiatives and schemes that are inclusive of individuals of all ages to address the existing skills disparity.

The findings of the qualitative study indicated that cultural disparities impacted the digital divide. Gender disparities were identified, where women's use and availability of ICT resources were impeded by cultural barriers and limitations. This finding aligns with existing research that has demonstrated a disparity between males and females in their use of technology. The qualitative data also highlight the digital divide between urban and rural areas, where resources and knowledge are limited. Prior research has demonstrated comparable findings, indicating disparities in digital opportunities and access between rural and urban regions. The findings underscore the necessity of implementing gender-inclusive approaches and targeted interventions in rural areas to surmount the cultural and societal barriers identified.

The qualitative data revealed varying viewpoints and stances regarding technology. Certain participants expressed skepticism regarding the efficacy of ICT, whereas others exhibited hesitancy or overt aversion to the use of digital instruments. Our findings align with those of [17-19] indicating that individuals' attitudes may impede their adoption of ICT. The findings of the qualitative study underscored the importance of considering users' privacy concerns and cultural values before fully embracing digital technology. The findings suggest a requirement for educational endeavors, initiatives aimed at enhancing digital literacy, and contextually relevant approaches that cater to individuals' distinct concerns and viewpoints regarding technology.

The necessity for governmental initiatives aimed at bridging the digital divide has been substantiated by both qualitative and quantitative investigations. The consensus among the participants was that government expenditure on infrastructure, initiatives aimed at enhancing

digital literacy, and policies that promote equity were deemed essential. Nonetheless, inquiries were raised regarding the efficacy and utility of the existing programs. Similar findings have been reported in [20], which examined the significance of government intervention in bridging the digital divide. The findings emphasize the necessity for effective policies, targeted interventions, and collaboration among the government, academia, and civil society to guarantee the efficacy and influence of digital inclusion initiatives.

Upon comparing quantitative and qualitative data, several similarities and differences can be observed. Both datasets emphasize the significance of access, skills, sociocultural variables, views, and government actions as key components of the digital divide. The quantitative patterns are complemented by the qualitative data, which provide detailed insights into individual experiences and perspectives, thereby offering contextualization. The incorporation of qualitative data can facilitate the exploration of nuanced factors, such as gender disparities and disparities between rural and urban areas, which may not be fully captured through quantitative analysis alone.

The quantitative findings offer statistical evidence of variations, associations, and discrepancies among the numerous dimensions of the digital divide. The use of broad statements enables us to gain a comprehensive understanding of the overall trend and its extent.

The integration of quantitative and qualitative data leads to the emergence of fresh perspectives, thereby reinforcing the identified barriers, disparities, and attitudes associated with the digital divide in Saudi Arabia and Jordan. The findings validate the outcomes of prior studies, reinforcing the notion that a multifaceted and widespread digital disparity prevails in these countries. The implications of these findings are noteworthy for the formulation of targeted interventions, policies, and initiatives that seek to narrow the digital divide and foster digital inclusivity among policymakers, stakeholders, and practitioners.

VI. CONCLUSION

This study aimed to enhance the comprehension of the digital divide in Saudi Arabia and Jordan by examining the correlation between ICT and society. This study employed a mixed method approach, encompassing both qualitative and quantitative data, to investigate the availability of ICT resources and proficiency in digital skills across these countries.

The study revealed significant challenges in

accessing ICT resources, primarily due to inadequate internet infrastructure and exorbitant fees. Variability exists among individuals in their capacity to effectively utilize digital technology, which can be attributed to factors such as age, educational attainment, and socioeconomic standing. Sociocultural factors, including gender inequality and the disparity between rural and urban regions, have contributed to the exacerbation of the digital divide. The adoption of ICT has been found to be influenced by individuals' attitudes and perceptions toward technology and concerns regarding personal privacy and the potential erosion of cultural customs. Despite concerns regarding their effectiveness and implementation, the study recognized the importance of governmental initiatives and policies in bridging the digital divide.

The identified hindrances and inconsistencies were substantiated through juxtaposition with prior studies, demonstrating the existence of the digital divide in Saudi Arabia and Jordan. The present study contributes to the existing literature by illuminating the distinctive situations of these countries and emphasizing the necessity of targeted interventions and policies to narrow the digital divide.

To bridge the digital divide, it is imperative to enhance infrastructure, foster digital literacy and skills acquisition, eliminate socio-cultural hindrances, promote positive attitudes toward technology, and ensure effective implementation of government initiatives. The closure of the digital divide between Saudi Arabia and Jordan through the use of ICT can facilitate revolutionary advancements, promote inclusivity, and foster socioeconomic development.

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