

What drives digital public service adoption? Romania's case

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Abstract

Offering digital public services is one of the main goals for digitalizing public sector organizations. Especially during these pandemic times, when lockdowns or the reluctance of people to go to crowded places made offering face-to-face services harder, public institutions upgraded and extended their digital offerings.

In Romania, the majority of public services are offered by city and town halls. In the last two years most of them tried to improve their existing digital services and to move online some that were offered only at the counter.

Previous studies showed that this supply-side increase is not enough, however. Are citizens using those new or improved services? Are there any other variables that influence the uptake of digital public services? We look at Romanian cities and try to see if we can discern any predictors for the success of online interactions between citizens and city halls. For this, we analyzed 15 municipalities in Romania and the success of the digital services they offer to citizens and we looked for correlations between digital service use and economic, educational and social variables.

Introduction

To use one of the most well known definitions, e-government employs new technologies and especially the internet for better governance (OECD, 2003). This means, in most cases, offering better public services with the help of new technologies. After the initial enthusiasm of moving services online, public institutions realized that this wholesale relocation is not enough. The supply of such services has, in many cases, outstripped demand, for a number of reasons that were, at first, not properly analyzed and understood. The uptake of the existing digital services was and continues to be, in many cases, disappointing (Digital Government MetaMonitor, 2022). Both researchers and public institutions tried to explain the relatively low usage and propose new theories and mechanisms for improving service provision. The e-government paradox (new digital public services adoption is almost universally below expectations, at least for a time) revealed that it is not only a "build-it-and-they-will-come" type of solution. There are many more factors beyond the technical obstacles that must be overcome. Political and institutional barriers impede the uptake of digital services (Savoldelli, Codagnone, & Misuraca, 2014). Concepts such as user-centricity (OECD, 2009) and multichannel public service delivery (Gagnon, Posada, Bourgault, & Naud, 2010) led to a better overall understanding of the problem and increased interactions between the public sector and citizens and companies.

The level of e-government development and the number and sophistication of public digital services in Romania is, according to DESI (European Commission, 2021), among the lowest in Europe on almost all indicators measured. Despite this generally bleak picture, there are some qualifiers to this situation. First, the generalist indexes such as DESI look at national level. This means that they tend to look at national e-services (such as eID systems, for example) and less at local level services. Second, the average numbers hide large variations. Over 45% of Romanians live in the rural areas that are typically less developed in terms of digital services. Big cities, on the other hand, usually offer their citizens a

wealth of e-services; the pandemic provided a new impulse and additional urgency to the already existing trend of increasing online access to government services. In Romania, most public services are offered at local level, especially by town and city halls.

A few national digital platforms that can be part of a coherent infrastructure ecosystem (such as ghiseul.ro, an online payment platform) are available, and, partially as an effect of the Next Generation EU program, more such platforms are now in different stages of implementation. In the following years, as this national infrastructure, both hardware and software, develops, Romanian public institutions should be able to offer more and better e-services with less effort.

A majority of Romanians has theoretically access to at least some digital public services. Yet the percentage of people that interact with public institutions online is the lowest in EU (European Commission, 2021). This data shows us that it is not only a matter of supply. In order to convince more citizens to access available digital services and demand for more, we need to understand what drives e-services uptake and what the determinants of adoption are. For this, we looked at data from an extensive survey, which covered over 15 thousand individuals and more than 7 thousand households, on their interaction with and use of technology. We tried to ascertain if variables such as education, income, place of residence, and use of private digital services could tell us anything about the propensity of citizens to use public e-services. In other words, we aimed to create a "sketch" of the typical Romanian online public service user.

Literature review

E-government and digital government literature expanded greatly in the last two decades. This is a sign that researchers perceive the increasing importance of e-services for both citizens or companies (more convenience, better quality) and public institutions (less resources, increased data access). The conceptual framework also undertook several transformations. It morphed from "IT in government" in the '70s, focused especially on the way in which technology was used in the back-office (the general aim was increased efficiency) (Kraemer, 1977), to e-government, which looked at the way in which "clients" (citizens, companies) make use of newly developed online channels to access information and perform transactions in their relationship with public institutions (Ho, 2002). Today we talk about digital government (Scholl, 2020) and governments try to understand how to better balance the sometime conflicting interest and needs of the stakeholders (institutions, companies, citizens, NGOs). As technology advanced and public agencies got more and more used to rely on technological tools, new concepts emerged, such as digitalization, digital transformation, e-services, or gov-tech.

It is important to distinguish between digitization, digitalization and digital transformation, which, although used many times interchangeable in literature, mean different things. Digitization is the transition from analog to digital processes; digitalization should be understood as a method which focuses on potential changes in the procedures beyond mere digitizing of existing processes and forms; and digital transformation involves deeper organizational changes, that also have cultural, organizational, and relational consequences (Mergel, Edelmann, & Haug, 2019) (Savić, 2019). Institutions cannot implement a true digital transformation process and significantly increase the quality of their services without internal changes (decision-making, policy development, regulation and enforcement, etc.) (Dobrolyubova, Klochkova, & Alexandrov, 2019).

In almost any country, more and more public services, informational or transactional, are accessible online. This is true also for Romania. Nevertheless, what is also almost universal is that the uptake of these available services is underwhelming. A number of models were proposed for the adoption of

public online services by citizens and companies. The most widely used are probably TAM and DOI. In the context of citizen-government interactions, the Technology Adoption Model (TAM) suggests that perceived ease of use (PEOU) and perceived usefulness (PU) define the attitude toward the tendency to use ITC in relation with public institutions (Davis, 1986). The diffusion of innovation theory (DOI) proposes that users will not use a system, which requires digital skills to get in touch with the government, unless the user feels that they have the necessary computer competence without outside help (Rogers, 2003). New models are proposed and tested all the time: Dwivedi *et al* proposes UMEGA, which aims to simplify the models that became more and more sophisticated and cumbersome to use (Dwivedi, et al., 2017). Mensah takes the UMEGA model and includes some facilitating conditions, found to influence the willingness of citizen in using e-government services (Mensah, Zeng, & Luo, 2020).

Before citizens can access digital services, public or private, they have to have internet access. In developed countries, more than 90% of citizens use the internet (European Commission, 2021), but if governments want to deliver services to all citizens, the left-behind categories of people should not be, well, left behind. Some researches uncover motives for lack of internet access (and specifically for broadband connections, which are required for high quality internet access) and suggest ways of extending internet coverage to all. Whitacre *et al* say that a number of different factors influence broadband adoption. For example, differences in demographic factors (age, income, education, and race) comprise approximately half of the rural-urban adoption gap (Whitacre, Strover, & Gallardo, 2015). This is an important precursor to government digitalization, because, as Trkman and Turk show, there is a link between diffusion of broadband and uptake of digital services, both public and commercial (Trkman & Turk, 2009).

Another research avenue is to look at predictors for e-services adoption. Multiple papers try to ascertain the best variables that can forecast digital services uptake. Among those, Lee *et al* finds statistical significance for some variables (number of inhabitants, percentage of people with broadband access) while other variables do not seem to influence adoption (median household income or poverty rate) (Lee, Chang, & Berry, 2011). Seifert and Charness research shows that the openness to using existing or future public services among older adults vary depending on the type of service and is influenced by age, interest in technology and attitudes toward digital services in general. People that successfully used digital services are more open towards using future such services and rate them more highly (Seifert & Charness, 2022).

deSouza *et al* find that, in Brazil, intensity of internet use, education and income are among the predictors for citizens attitudes toward digital and open government services (de Souza, d'Angelo, & Lima Filho, 2022). Kuk's research points towards an association between the number of internet users a region or municipality has and the quality and quantity of digital services offered (Kuk, 2003). Faulkner *et al* look at the most common factors, and identify a number of predictors that literature uses for e-government uptake. Most of them have to do with "internal" characteristics (trust, perceived ease of use and usefulness, awareness, barriers, civic mindedness). Demographic factors are also usually used in the literature (Faulkner, Jorgensen, & Borg, What Encourages Citizens to Use E-government? A Rapid Review and Comprehensive Model, 2017).

For businesses, the willingness of companies to use digital services seems to be influenced by the trust relationship and the perception of quality of offline services offered by the public institution (Lee, Kim, & Ahn, 2011).

In an effort to increase the usage of digital services, some public institutions collaborated with researchers to study ways in which citizens can be „nudged” to use them more. Some studies show

that small interventions (altering defaults, providing direct help, promoting the benefits of online interactions) can significantly increase citizens' use of a digital service (Faulkner, Jorgensen, & Koufariotis, Can behavioural interventions increase citizens' use of e-government? Evidence from a quasi-experimental trial, 2019). The channel choice (online, face-to-face, telephone) through which citizens choose to access services is also studied. Wolfgang et al advances that channel choice is not always a rational and logical choice, and the perceived complexity of the task influences the way in which citizens access the service (the more complex a task, the more they tend to choose direct interactions - telephone or face-to-face) (Ebbers, Jansen, Pieterse, & van de Wijngaert, 2016). Digital skills do not play a significant role in channel choice, but they predict the level of satisfaction: the more digitally adept are more satisfied with their online interactions (Ebbers, Jansen, & van Deursen, Impact of the digital divide on e-government: Expanding from channel choice to channel usage, 2016). A real-world experiment shows that nudging can help with digital service adoption (Hyytinen, Tuimala, & Hammar, 2022).

Methodology

Based on the literature and the dataset available (a detailed survey on how Romanians use technology, detailed below), we tried to find the factor that predict digital public services use in Romania.

Our hypotheses were as follows:

1. There is a positive correlation between education and accessing digital services (persons that are more educated tend to use more often public eservices).
2. People living in urban areas are using digital services more than those living in rural areas.
3. People with higher incomes are using e-government services more than those with lower income.

In this research, the data from the research "Digital economy and society statistics - households and individuals" carried out in Romania and in the states of the European Union were used.

The sample from Romania was made as follows:

- 7.1% from the Bucharest - Ilfov region;
- 11.9% of the Center region;
- 17.3% of the North-East region;
- 13.9% of the North-West region;
- 11.6% of the South-East Region;
- 15.4% of the South - Muntenia region;
- 11.2% of the South - West Oltenia region;
- 10.4% of the West region.

The sample size in Romania is 15.643 respondents out of 7459 households. The division by gender is done as follows:

- 48.8% men;
- 51.2% women.

Respondents' education is detailed below:

- 22.3 % at most lower secondary education (ISCEDD=0, 1 or 2);
- 64.1% upper secondary and post-secondary non-tertiary education (ISCEDD=3 or 4);

- 13.4% tertiary education (ISCEDD=5, 6, 7 or 8).

Findings

The vast majority of Europeans use the internet, both for work and for leisure. The Covid-19 pandemic accelerated the already existing trend of using the internet to access services and buy goods. Commercial companies took advantage of these change in habits and offered more and better online services, leveraging the high number of people that spend their time online every day.

In the last 10 years we have seen a significant increase in most European countries, including Romania. The number of people that use the internet in Romania approaches 90%, and could reach close to the European average in the next few years. Approximately 65% of the Romanian population uses the internet every day or even almost every day. Thus, we can see that a large part of the population spends their time on the internet. A study shows that Romanians between the ages of 16 and 84 spend about 7 hours and 26 minutes on the Internet (Kemp, 2021).

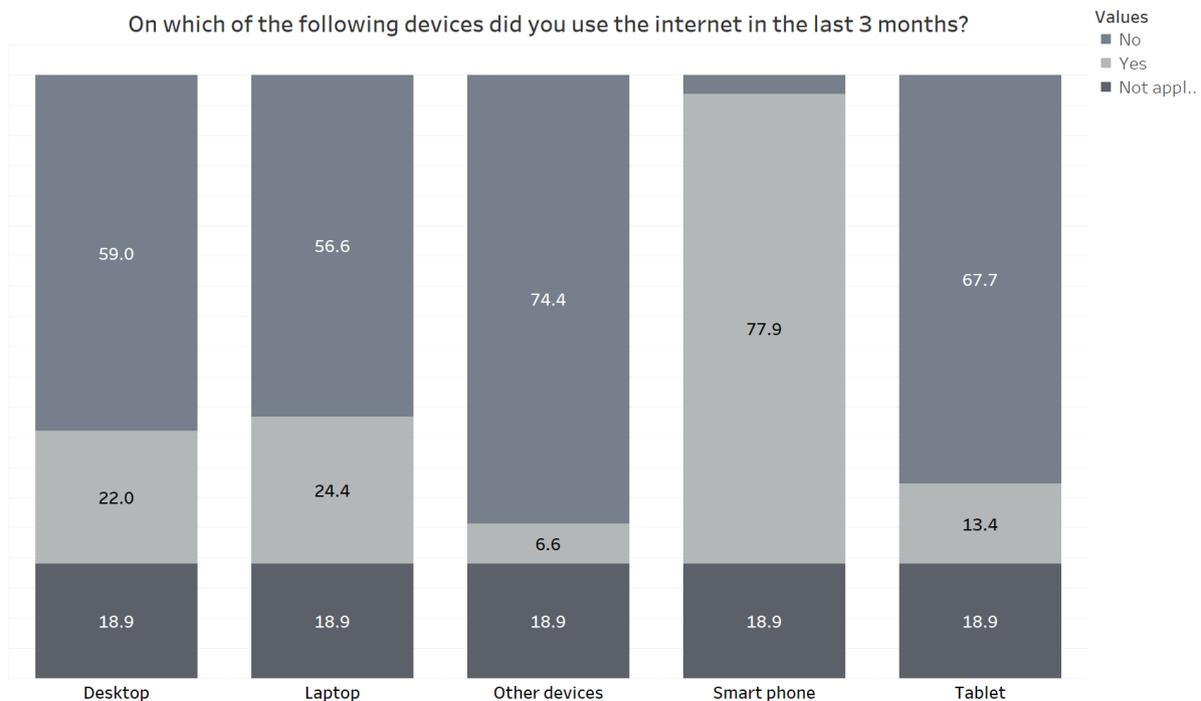


Figure 1. Devices used for internet access

When it comes to online connection methods, Romanians prefer to use smartphones (77.9%). Also in the top of preferences are the laptop (24.4%) and desktop computer (22%). The online environment is increasingly accessible and can be used on various gadgets that can facilitate the online interaction of participants.

Internet accessibility can facilitate communication, work and many other aspects of citizens' lives. We can see the behavior of citizens regarding the online environment in the following statements:

- Only 3.9% of the population is selling goods or services via a website or app (e.g. eBay, Facebook, Marketplace, shpock);
- 12.9% use internet banking (including mobile banking);

- 9.6% express opinions on civic or political issues on websites or social media (e.g. Facebook, Twitter, Instagram, YouTube);
- Only 2.8% takes part in online consultations or voting to define civic or political issues (e.g. urban planning, signing a petition).

The relationship between citizens and public authorities regarding the accessibility and use of digital platforms to interact is not a favorable one in the Romanian context. We are talking more and more about the digitalization of public services, but the question is: do citizens use them?

A small percentage of Romanians (15%) used digital means to interact with public authorities in 2021 and we are well below the European average on this metric.

Thus, a relatively small percentage of people get information from local government applications and websites. The main reason seems to be the fact that Romanians did not have to solve online situations with local public administrations (77% of them).

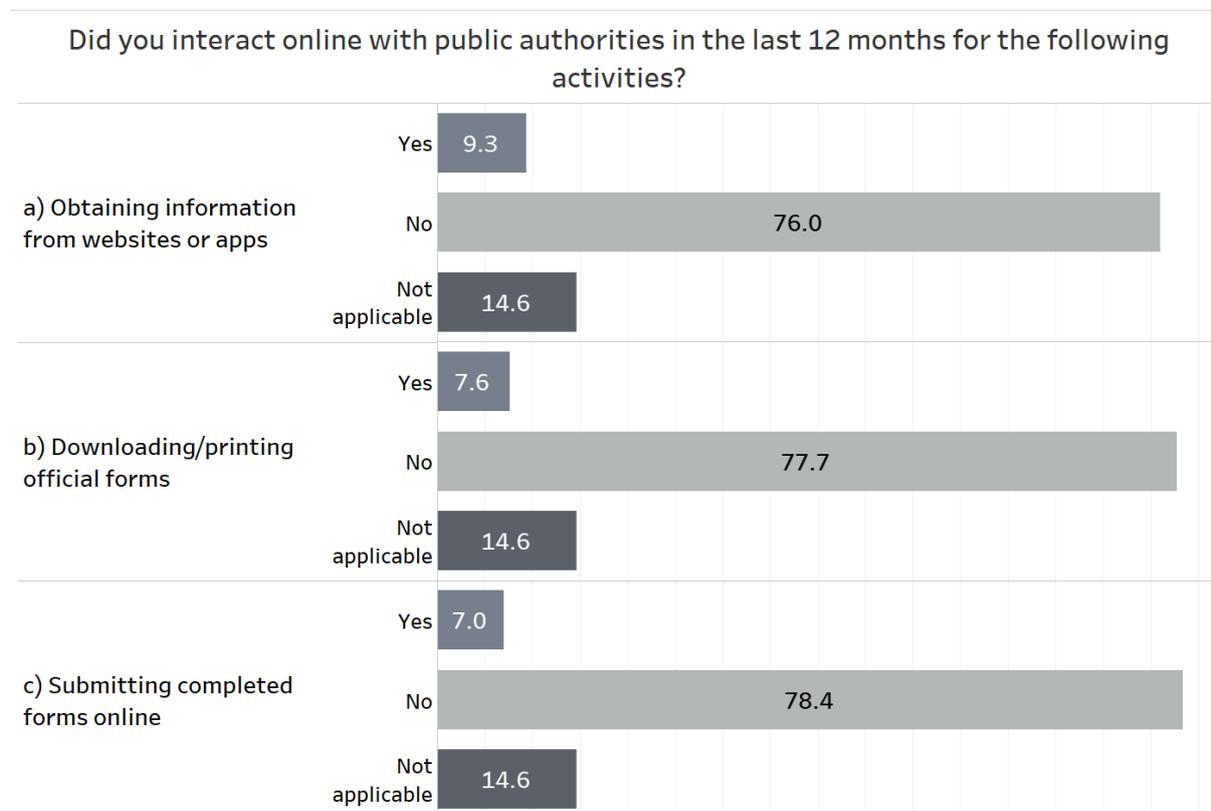


Figure 2. Online interaction with public institutions

Even if the number of Romanians that interact with public institutions online is gradually increasing, year-on-year, the pace is a very slow one. We note that only 15% of the population use the internet to interact with public authorities and only 11% of the population get information from official sources. In addition, individuals in Romania do not generally use digital media to solve the situations they face (9%).

Testing hypotheses

In this case, education cannot be a predictor of accessing digital services (-.125, -.125 and -.137, Spearman's rho 0.0). The hypothesis from which I started is refuted and no correlation or causality can be established regarding these aspects.

			Educational attainment level (highest level of education successfully completed)	C1: Did you contact or interact with public authorities or public services over the internet for private purposes in the last 12 months for the following activities? a) Obtaining information from websites or apps
Spearman's rho	Educational attainment level (highest level of education successfully completed)	Correlation Coefficient	1.000	-.125**
		Sig. (2-tailed)	.	.000
		N	15643	15643
	C1: Did you contact or interact with public authorities or public services over the internet for private purposes in the last 12 months for the following activities? a) Obtaining information from websites or apps	Correlation Coefficient	-.125**	1.000
		Sig. (2-tailed)	.000	.
		N	15643	15643

** . Correlation is significant at the 0.01 level (2-tailed).

			Educational attainment level (highest level of education successfully completed)	b) Downloading/ printing official forms
Spearman's rho	Educational attainment level (highest level of education successfully completed)	Correlation Coefficient	1.000	-.125**
		Sig. (2-tailed)	.	.000
		N	15643	15643
	b) Downloading/printing official forms	Correlation Coefficient	-.125**	1.000
		Sig. (2-tailed)	.000	.
		N	15643	15643

** . Correlation is significant at the 0.01 level (2-tailed).

			Educational attainment level (highest level of education successfully completed)	c) Submitting completed forms online
Spearman's rho	Educational attainment level (highest level of education successfully completed)	Correlation Coefficient	1.000	-.137**
		Sig. (2-tailed)	.	.000
		N	15643	15643
c) Submitting completed forms online		Correlation Coefficient	-.137**	1.000
		Sig. (2-tailed)	.000	.
		N	15643	15643

** . Correlation is significant at the 0.01 level (2-tailed).

Even if there is no strong correlation, we can see that the level of urbanization influences the access of digital services by individuals. Given that digital services are used by a small number of people, we can be confident about the influence that the home environment can have. (0.22 and Spearman's rho 0.6, 0.35 and Spearman's rho 0.0 and 0.43 and Spearman's rho 0.0)

		Geographical location	C1: Did you contact or interact with public authorities or public services over the internet for private purposes in the last 12 months for the following activities? a) Obtaining information from websites or apps
Geographical location	Pearson Correlation	1	-.029**
	Sig. (2-tailed)		.000
	N	15643	15643
C1: Did you contact or interact with public authorities or public services over the internet for private purposes in the last 12 months for the following activities? a) Obtaining information from websites or apps	Pearson Correlation	-.029**	1
	Sig. (2-tailed)	.000	
	N	15643	15643

** . Correlation is significant at the 0.01 level (2-tailed).

		C1: Did you contact or interact with public authorities or public services over the internet for private purposes in the last 12 months for the following activities? a) Obtaining information from websites or apps	Degree of urbanisation
C1: Did you contact or interact with public authorities or public services over the internet for private purposes in the last 12 months for the following activities? a) Obtaining information from websites or apps	Pearson Correlation	1	.114**
	Sig. (2-tailed)		.000
	N	15643	15643
Degree of urbanisation	Pearson Correlation	.114**	1
	Sig. (2-tailed)	.000	
	N	15643	15643

** . Correlation is significant at the 0.01 level (2-tailed).

		Degree of urbanisation	b) Downloading/ printing official forms
Degree of urbanisation	Pearson Correlation	1	.116**
	Sig. (2-tailed)		.000
	N	15643	15643
b) Downloading/printing official forms	Pearson Correlation	.116**	1
	Sig. (2-tailed)	.000	
	N	15643	15643

** . Correlation is significant at the 0.01 level (2-tailed).

When it comes to the income of people who use the internet in order to interact with local public authorities, there is no correlation on these issues. Thus, the hypothesis is refuted.

			G18: Total average net current monthly income	b) Downloading/ printing official forms
Spearman's rho	G18: Total average net current monthly income	Correlation Coefficient	1.000	-.086**
		Sig. (2-tailed)	.	.000
		N	11414	11414
	b) Downloading/printing official forms	Correlation Coefficient	-.086**	1.000
		Sig. (2-tailed)	.000	.
		N	11414	15643

** . Correlation is significant at the 0.01 level (2-tailed).

			G18: Total average net current monthly income	C1: Did you contact or interact with public authorities or public services over the internet for private purposes in the last 12 months for the following activities? a) Obtaining information from websites or apps
Spearman's rho	G18: Total average net current monthly income	Correlation Coefficient	1.000	-.078**
		Sig. (2-tailed)	.	.000
		N	11414	11414
	C1: Did you contact or interact with public authorities or public services over the internet for private purposes in the last 12 months for the following activities? a) Obtaining information from websites or apps	Correlation Coefficient	-.078**	1.000
		Sig. (2-tailed)	.000	.
		N	11414	15643

** . Correlation is significant at the 0.01 level (2-tailed).

			G18: Total average net current monthly income	c) Submitting completed forms online
Spearman's rho	G18: Total average net current monthly income	Correlation Coefficient	1.000	-.100**
		Sig. (2-tailed)	.	.000
		N	11414	11414
	c) Submitting completed forms online	Correlation Coefficient	-.100**	1.000
		Sig. (2-tailed)	.000	.
		N	11414	15643

** . Correlation is significant at the 0.01 level (2-tailed).

The analysis also showed that people that are using commercial digital services are more likely to use public e-services, but this is not valid in case of participatory tools, only informational and transactional services.

Conclusion and limits

Our data analysis was a frustrating one. We found that most factors described in the literature as having an influence on public e-services adoption were not validated by our investigation. Those variables that showed an influence (place of living, use of commercial digital services) have low statistical power.

These results can be explained in a number of ways. One possibility is that our analysis is flawed in ways that we are not able to see. A revisit of our assumptions and methodology is in order.

Second, it is possible that the dataset is inconsistent (the number of respondents is large and the sampling is sound, but there are very large numbers of incomplete responses to the survey). For this, we will conduct a new research, when the new batch of data becomes available, and eliminate from our analysis the incomplete questionnaires.

Third, it is possible, although unlikely, that the predictors that work in other countries do not work in Romania, for whatever reason. More research is necessary in this direction, including comparative studies.

Even if we failed in our quest to create a portrait of the "standard" Romanian public digital service users with this enquiry, we still think this is a worthwhile goal, that could help public institutions design their online offerings better and in ways that increase interactions. We hope that future studies will shed more light on the issue.

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