European Research Studies Journal
Volume XXVIII, Issue 1, 2025

pp. 459-471

Bridging the Digital Divide: The Role of Proxy Users in Online Purchasing and Social Sustainability

Submitted 12/12/24, 1st revision 22/01/25, 2nd revision 15/02/25, accepted 28/02/25

Agnieszka Laskowska[1], Łukasz Skowron[2], Edward Kozłowski[3], Jan Laskowski[4]

Abstract:

Purpose: *The purpose of the study is to investigate whether and, if so, how dependent or digitally excluded people use purchases and services available via the Internet.*
Design/Methodology/Approach: *A survey was conducted using the CAVI technique on a sample of 1,000 adult Polish citizens. The relationship between variables was examined using the χ2 test. The strength of the relationship was examined using the Freemans theta coefficient and V-Cramer. Data analysis was supplemented with descriptive statistics.*
Findings: *The research confirmed that dependent or digitally excluded people make purchases on the Internet with the help of shopping intermediaries. „proxy" users are most often women aged 25 to 34 and men aged 35 to 44. Those most likely to use proxies for online shopping are seniors aged 61-70 from their immediate family circle.*
Practical Implications: *The findings of this research will facilitate the enhancement of the ergonomics and security of the online shopping process, with the objective of adapting it to the requirements and needs of digitally dependent individuals.*
Originality/Value: *The research will contribute to improving the effectiveness of the fight against digital exclusion and the implementation of the concept of a sustainable digital economy.*

Keywords: *Digital exclusion, digital divide, consumer behavior, e-commerce, proxy user, sustainable economy.*

JEL codes: *D12, L81, L86, O33.*

Paper Type: *Research Paper*

Acknowledgement: *This research was financed in the framework of the pro-quality program of Lublin University of Technology „Grants for grants" (Grant nr: 4/GnG/2023). The article is also the result of Agnieszka Laskowska's scientific internship that took place at the Vilnius Tech University on 25.11.2024–24.12.2024.*

[1]*Department of Marketing, Faculty of Management, Lublin University of Technology, Poland, e-mail: a.laskowska@pollub.pl;*
[2]*The same as in 1, e-mail: l.skowron@pollub.pl;*
[3]*Department of Quantitative Methods in Management, Faculty of Management, Lublin University of Technology, Poland, e-mail: e.kozlovski@pollub.pl;*
[4]*The same as in 1, e-mail: j.laskowski@pollub.pl;*

1. Introduction

Ubiquitous digitization and the development of artificial intelligence are now influencing and shaping almost all aspects of daily life, from the way people learn, work, shop and make daily choices, to communication and maintaining social relationships, to entertainment and leisure activities. It is impossible not to mention the phenomenon of large language models such as Chat GPT or Gemini, which in less than two years have achieved analytical and programming capabilities far beyond the skills of a well-educated person, and this is only the beginning of their development.

Machine learning and AI technologies are now no longer only used in technical sciences such as transport (Laskowski *et al.*, 2024) or industry (Majerek *et al.*, 2021; Rymarczyk *et al.*, 2021), but also in the social sciences (Dmowski *et al.*, 2023; Laskowski and Tomiło, 2023). However, despite the undeniable benefits of access to these modern technologies, their proliferation brings challenges, especially for people who are unable or incapable of adapting to the new digital realities of life and their associated demands.

This problem became particularly apparent during the Sars-Cov-2 pandemic, when virtually overnight most areas of the economy and social life had to switch to online operation (Degli Esposti *et al.*, 2021; Grashuis *et al.*, 2020). These changes affected not only the trade and service sector, but also affected the way we provide work (remote work), public administration (e-government), and even health care (tele prescribing, e-prescribing) and education (remote teaching) (Laskowska and Laskowski, 2021), and their long-term consequences are still with us today, shaping the image of modern society.

This situation has highlighted the difficulties that digitally dependent people, i.e., those with limited technological competence, face in meeting their basic needs, including when completing the process of purchasing goods and services available online. At the same time, it should be noted that this problem now no longer affects only particularly vulnerable social groups, such as the elderly, the poor, the less educated and the disabled, but is also beginning to include young and educated people who, for various reasons, are unable to keep up with the very dynamic development of digital technologies. For many of them functioning in a virtual environment has become a necessity, requiring both technical and social support.

A library and Internet search conducted at the initial stage of the research revealed a lack of consistent literature sources that accurately analyse and characterize how people who are digitally dependent or digitally excluded use purchases and services available via the Internet. All this implies the need to undertake research work aimed at determining how digitally dependent people meet their needs for consumption of goods and services available on the Internet.

The results of the research will be an important contribution to the realization of the concept of a digitally sustainable, inclusive society. The issue under study is also part of the ongoing transformation of the world to the era of Industry 5.0, whose main goal is to use new digital technologies, processes, and business models to create a resilient, sustainable, and human-centred economy (Laskowska and Laskowski, 2022).

2. Literature Review

The term „e-commerce," which stands for „electronic commerce," describes the exchange of products and services over the internet. It includes a wide range of activities, including as online shopping, business-to-business transactions over the internet, online auctions, and the buying and selling of services. E-commerce has expanded quickly in recent years because of rising internet shopping usage among consumers and company adoption of digital technology for operational efficiency (Abdelrhim *et al.*, 2020; Chaffey *et al.*, 2019; Hanson and Kalyanam, 2020; Laudon and Traver, 2020).

The virtual shopping and service environment is a complex, multidimensional space where consumers, through websites and online applications, can travel the entire purchase path and experience the experience of acquiring a specific product or service. This environment goes well beyond the realm of traditional online shopping transactions, offering consumers an expansive array of experiences and interactions related to a product, service, or brand (Chaffey *et al.*, 2019; Laudon and Traver, 2020).

The phrase „digital exclusion" is used in the literature to refer to the disparity in ICT (information and communication technology) access, use, and abilities between various social groups. The digital gap, for instance, is described by the Organization for Economic Cooperation and Development (OECD) as „the gap between individuals, households, businesses and geographic areas at different socioeconomic levels in terms of both their ability to access and use information and communications technology (ICT) and their ability to use the Internet" (OECD, 2000).

Because access to ICT is becoming an increasingly necessary condition for full participation in contemporary society and the economy, digital exclusion can have major social and economic repercussions. In terms of education, employment prospects, information access, and civic engagement, those without access to ICT may be at a disadvantage.

Digital exclusion is influenced by a number of variables, including place of residence, income, degree of education, age, and race or ethnicity. Low-income individuals might not be able to afford Internet access or a computer, while others who live in rural or distant places might only have limited access to high-speed

Internet. Like the elderly and those with impairments, these groups may have low digital capabilities and skills (Ertl *et al.*, 2020; Hidalgo *et al.*, 2020; Ma *et al.*, 2020; Śmiałowski, 2020; Tirado-Morueta *et al.*, 2018).

The phenomenon of the digital gap or digital divide, defined as inequalities in access, skills and use of information and communication technologies (ICTs), provides a key context for analysing the results of research on virtual purchasing decisions by digitally dependent people. As Helsper and Van Deursen and Van Dijk emphasize in their work, the digital gap is multidimensional in nature and includes physical (access to infrastructure), skill (digital competence) and motivational (attitudes toward technology) factors (Helsper, 2021; van Deursen and van Dijk, 2013).

Qualitative research on the relationship of people who are not using the Internet with information and communication technologies shows that these people mostly have some indirect contact with the digital sphere (Reisdorf *et al.*, 2016). One of the ways in which digitally excluded, or digitally dependent people access and use online resources is through another person's Internet use (Proxy Internet Use) (Dolničar *et al.*, 2018; Selwyn *et al.*, 2017). The concept of a „proxy" or otherwise Internet proxy user is that a person performs certain activities online for or on behalf of another person (Grošelj *et al.*, 2022; Selwyn *et al.*, 2005).

These usually involve simple tasks, such as buying things online, accessing information or using banking and government services on the Internet (Reisdorf et al., 2021). Based on this information, it was hypothesized that *digitally dependent people access and use purchases and services available on the Internet using the help of others, so-called "proxy" users*.

3. Methodology

The survey was conducted in the first quarter of 2023 and included a sample of 1,000 adult Poles, participants in the *Opinion Research* online panel. The sample included a representative distribution by age and gender. The survey included 501 women and 499 men. About half of the people surveyed were aged 25 to 34 (24%) and 35 to 44 (26%), respectively.

More than half of the respondents (59%) said they were married, while 32% were singles. Half of the respondents had secondary education (46%) and higher education (43%), with a higher percentage of female respondents (25%) than male respondents (18%) having a university degree. Work activity related to a full-time job or employment contract was declared by 67% of all respondents.

The study questionnaire contained 4 ordinal scale questions and 3 descriptive questions with a nominal scale, while the main study questionnaire contained 1 ordinal scale question and 3 questions with the Charles E. Osgood interval-

semantic differential scale (Osgood, 1964). This scale has values from 1 to 5, where 1 is the least important and 5 the most important. The intervals between successive values of the scales were designed to be equal, making them interval scales. The questionnaire was tested for reliability by internal consistency analysis using Cronbach's Alpha (α), and McDonald's Omega (ω) tests. The results of the tests (α=0,83, ω=0,84) confirm the overall very good internal consistency of the questionnaires and their reliability in measuring the studied constructs.

To select an appropriate statistical test, a Shapiro-Wilk test of normality of distribution was conducted at the beginning of the procedure (Shapiro and Wilk, 1965). The relationship between respondents' answers and (respectively) gender, education level, marital status, age group or occupational status, was examined using the χ^2 test (with Yates correction for classes with a smaller size than 10) (Bergsma, 2013). The strength of the relationship was examined by the gamma coefficient and the Freeman theta coefficient.

The Freeman theta coefficient measures the strength of the relationship between a variable measured on an ordinal scale and a nominal variable, while the V-Cramer coefficient measures the strength of the relationship between nominal variables. The values of these coefficients range from 0 to 1 indicating the strength of the relationship (Freeman, 1965). Data analysis was supplemented with elements of descriptive statistics.

4. Research Results and Discussion

The relationship between the answers given by respondents to the question of *whether you have ever shopped online for another person* and (respectively) gender, level of education, marital status, age group or occupational status was examined using the χ^2 test.

Yates correction was applied if there were classes with a size of less than 10. In all issues, the null hypothesis of no relationship between groups was set against the alternative hypothesis that such a relationship exists.

Based on the results of the χ^2 test (significance level p = 0.05), the null hypotheses were rejected, and the alternative hypotheses were accepted, meaning that there were statistically significant relationships between the answers given by respondents and variables such as gender, marital status, education, occupational status and age (Table 1).

Table 1. *Statistically significant relationships*

Variable	Chi-square	p-value	Freeman's theta	V-Cramer
Gender	12.14	0.0005	-	**0.111**
Marital status	31.87	5.57e-07	-	**0.179**

Education	20.88	0.0001	0.1856	-
Occupation	41.85	1.97e-07	-	**0.205**
Age	**81.60**	**3.89e-16**	**0.4241**	-

Source: *Own creation.*

Based on the results of the χ^2 test, all variables analyzed, i.e. respondents' gender, marital status, education, occupation and age, had a statistically significant effect on the frequency with which they acted as 'proxy' users; however, the strength of these relationships varied significantly between variables. The Freeman's Theta value of 0.4241 indicates a moderately strong (and perhaps already strong) relationship between respondents' age and their role as 'proxy' users. In other words, the age of the respondents is a factor that significantly influences their performance as "proxy" users.

The respondents' occupation (V-Cramer = 0.205) and marital status (V-Cramer = 0.179) also influence their performance as a "proxy" user, but these relationships are weak to moderate. Their education (Freeman's theta = 0.1856), on the other hand, has a small but still significant effect on the frequency with which they help digital dependents with online activities. The last variable considered is the gender of the respondent. Although this variable is statistically significant (p = 0.0005), its effect on acting as a "proxy" user is very weak (V-Cramer = 0.111).

As a result, although all characteristics of the respondents have a statistically significant effect on their performance as "proxy" users, age and occupation are factors with a relatively stronger effect compared to the other variables. It can be assumed that the younger the respondent, the more often he or she acts as a proxy user, while older people are much less likely to take on this role.

Based on the survey, it can be concluded that most respondents (more than 80%) made online purchases on behalf of another person. It should be noted here that women (89%) were slightly more likely to play the role of shopping helper ("proxy" user) than men (81%). This difference is probably due to women's greater involvement in helping elderly family members.

Typically, these are ladies between the ages of 25 and 34 (37%). In the case of men, those aged 35 to 44 were the most likely to help with online shopping (almost 30%). The statistical proxy user is a married woman (55%) or married man (64%), working on a contract or full-time job (70% for men and 68% for women) and with a secondary (men - 47%) or higher education (women - 51%). Detailed characteristic of people playing the role of "proxy" users was presented in Table 2.

Another issue of significance in the context of the research pertained to the identification of the demographic most frequently assisted with online shopping (Figure 1). The findings revealed that the predominant group of individuals for whom respondents made online purchases were parents (38%), closely followed by

close relatives (27 %), and friends (26%).With regard to the frequency of online purchases made on behalf of these individuals, it was observed that the frequency was similar across all groups, with respondents indicating a frequency of two to three times per year. This suggests that this phenomenon is not a very frequent occurrence.

Table 2. *Characteristics of people playing the role of "proxy" users*

		Woman		**Man**	
		n	%	n	%
Gender		445	52.79	398	47.21
Age	18 - 24	91	20.45%	28	7.04%
	25 to 34	**165**	**37.08%**	62	15.58%
	35 to 44	112	25.17%	**117**	**29.40%**
	45 to 54	37	8.31%	94	23.62%
	55 to 64	30	6.74%	63	15.83%
	65 years and older	10	2.25%	34	8.54%
Marital status	Single	168	37.75%	107	26.88%
	Married	**245**	**55.06%**	**256**	**64.32%**
	Divorced	25	5.62%	30	7.54%
	Widowed/widowered	7	1.57%	5	1.26%
Education	Elementary	11	2.47%	10	2.51%
	Basic vocational	16	3.60%	47	11.81%
	Secondary	192	43.15%	**187**	**46.98%**
	Higher	**226**	**50.79%**	154	38.69%
Professional situation	Studying	49	11.01%	22	5.53%
	Unemployed	48	10.79%	16	4.02%
	Employed	312	70.11%	274	68.84%
	Retired	14	3.15%	38	9.55%
	Working retiree	3	0.67%	19	4.77%
	Working pensioner	3	0.67%	10	2.51%
	Own business	16	3.60%	19	4.77%

Source: *Own creation.*

A tendency towards slightly more frequent purchases for immediate family members, specifically parents, was also noted. This can be attributed to the tendency to self-benefit from immediate family members. It is noteworthy that the group of close relatives and friends exhibits a comparable level, regarding the frequency and quantity of goods purchased online. This may be indicative of the relatively high level of trust that representatives of these groups place in the respondents.

The next stage of the research work was to characterize the group of people who most often used proxy user assistance, i.e. the parents of the respondents (Table 3). According to the data, the average father who requires assistance when shopping online is a person who is economically active (42%) and between the ages of 61 and 70 (38%) and who has a basic vocational education (44 %). In contrast, the

statistical mother who uses Internet shopping assistance is a person who is retired (45%), aged 61 to 70 (35%) and has a secondary level education (45%).

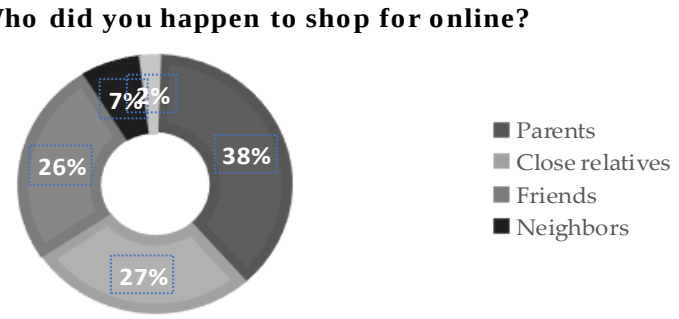

Table 3. *Characteristics of people who most often used proxy user assistance*

		Father		**Mother**	
		n	%	n	%
Age	up to 55	112	29.32%	153	32.01%
	56 to 60	60	15.71%	65	13.60%
	61 to 70	**147**	**38.48%**	**169**	**35.36%**
	71 to 80	50	13.09%	67	14.02%
	80 years and older	13	3.40%	24	5.02%
Education	Elementary	29	7.59%	25	5.23%
	Basic vocational	168	**43.98%**	**149**	31.17%
	Secondary	133	34.82%	**214**	**44.77%**
	Higher	52	13.61%	90	18.83%
Professional situation	Works	**162**	**42.41%**	178	37.24%
	Does not work	13	3.40%	49	10.25%
	Runs his own business	32	8.38%	11	2.30%
	On pension	29	7.59%	27	5.65%
	Retired	146	38.22%	**213**	**44.56%**

Source: *Own creation.*

The study shows that most respondents (surpassing 80%) engaged in purchasing goods and services online on behalf of another individual, thereby functioning as shopping assistants, or "proxy" users. The research findings indicated that individuals who employ "proxy" users are predominantly those with limited digital competence, who are unable to fully execute all activities related to the process of purchasing goods and services on the Internet independently.

This aligns with the research conducted by D. Grošelj and B. Reisdorf, which demonstrated that the primary function of "proxy" users is to facilitate activities necessitating advanced digital competencies (Grošelj et al., 2022). These activities

pose significant challenges for individuals with limited digital proficiency, underscoring the crucial role of "proxy" users in providing assistance.

Extant research has demonstrated that age exerts a substantial influence on the manner in which individuals utilize online purchases and services, as well as on the prevalence of the "proxy" user phenomenon. This notion is further substantiated by numerous other publications addressing this subject (Petrovčič et al., 2024). The Technology Acceptance Model (TAM), proposed by M.G. Morris and V. Venkatesh, posits that age is a pivotal factor hindering independent utilization of digital technologies (Morris and Venkatesh, 2000).

The TAM model asserts that a user's adoption of a technology is predominantly influenced by two factors: perceived usefulness and perceived ease of use. It has been demonstrated that older users frequently evaluate technologies as being less useful and more difficult to use, which consequently engenders elevated barriers to adoption and subsequent utilization.

These observations have been substantiated in a study by N.M. Gel, wherein it was ascertained that individuals over the age of 65 exhibit considerably diminished confidence in their Internet usage in comparison to younger demographics (Gell *et al.*, 2015).

The studies clearly indicate the importance of the influence of social factors on the frequency of use of "proxy" user assistance. They showed that the people who most often use the help of "proxy" users are parents, followed immediately by relatives. It is noteworthy that the utilization of „proxy" assistance in online shopping is a prevalent phenomenon, with approximately one-quarter (23%) of the "proxy" user population admitting to engaging in this activity two to three times per month, and an additional 25% reporting it as a monthly occurrence.

These findings substantiate the correlation between social support and the abatement of technological barriers, a notion that has been extensively documented in extant literature on the subject. A notable illustration of this phenomenon can be observed in the research conducted by a team under the leadership of V. Doličar, which demonstrated that familial and relational support, manifesting as assistance in the execution of online activities, that is to say, the act of serving as a "proxy" user, plays a pivotal role in mitigating technological exclusion, particularly within the context of intergenerational solidarity (Chiu *et al.*, 2019; Dolničar *et al.*, 2018).

This finding underscores the necessity for a more comprehensive approach to the problem of reducing barriers to accessing Internet resources. Such an approach must consider not only infrastructure and technology, but also multidimensional socioeconomic and environmental factors. However, the phenomenon of indirect use of the Internet cannot be regarded as a long-term solution to the problem of digital exclusion.

The assistance of "proxy" users is of an ad hoc nature and does not improve digital competences (Petrovčič *et al.*, 2022). Consequently, there is a necessity to implement educational programs that present the benefits, but also the risks of using digital technologies, and to organize practical training to develop skills for using Internet resources. These educational programs should be targeted at groups most at risk of exclusion.

3. Conclusions

In summary, the results of the study presented above allowed for the verification of the hypothesis, assuming that digitally dependent persons make purchases and use services available on the Internet through other persons (so-called "proxy" users). The study demonstrated that the majority of respondents (over 80%) made purchases of goods and services over the Internet on behalf of another person, thereby acting as shopping assistants or "proxy" users.

Those who use the assistance of "proxy" users are people with limited digital competences, who are unable to fully complete the process of purchasing goods and services online themselves. The study also found that respondents' age and educational attainment significantly influence their propensity to employ "proxy" users, thereby underscoring the relevance of the "proxy" user phenomenon in the context of online purchasing decisions. It was also verified that younger respondents tend to act more frequently as "proxy" users. It should be noted here that slightly more often women than men took on the role of shopping helper.

"Proxy" users tended to be women aged 25 to 34 and men aged 35 to 44. They tended to be married, employed on a contract or full-time basis and with a secondary level education (men) or higher education (women). The largest group of people who used "proxy" users were parents, close relatives and friends.

The frequency with which online purchases were made on behalf of these people was similar in all the groups, at 2 to 3 times a year. The statistical person who is assisted in making purchases online is a professionally active, basic vocational-educated man aged 61 to 70, or a retired, secondary school-educated woman of the same age.

However, it should be acknowledged that the research is not without its limitations. The most significant of these appears to be the restriction of the research population to Poles, whose uniqueness (historical, social, and cultural traits) may have some bearing on the study's findings. Consequently, it would be beneficial to conduct analogous research in the future in nations exhibiting varying degrees of digital exclusion (e.g., other EU countries, the US).

Another intriguing and significant subject for future research is the question of the influence of "proxy" users on the selection of items and on the progression of the

various stages of the purchase decision-making process in a virtual environment. Furthermore, the presence of "proxy" users during the purchasing process may necessitate a modification in the direct addressee of the marketing message, a subject that requires further study.

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