

Research Article

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Digitalization of administrative work at home

Findings of an online survey

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Abstract: People must perform bureaucratic, administrative work in daily life, such as applying for official documents, concluding contracts, organizing purchases, managing pension plans, etc. This work is time-consuming and unequally distributed in the household. At its best, it is perceived as boring; at its worst, it is mentally and emotionally stressful, leaving people overwhelmed and unable to fulfill their obligations. People can benefit from the digitalization of domestic bureaucracy automating repetitive tasks, reducing mental effort, and saving time for leisure activities. In recent years, there has been a need for more empirical knowledge about the use of technology or the working environment for this purpose. This paper presents insights from an online survey with 617 socio-demographically distributed participants highlighting the devices, tools, special software, and common places people favor for accomplishing these office-like household chores. Our results provide a solid empirical basis that not only quantifies previous qualitative results now using the German adult population but also offers orientation for further in-depth research as well as design.

CCS CONCEPTS: Human-centered computing → Empirical studies in HCI; Collaborative and Social Computing

Keywords: household management; life admin; domestic workplace studies; tools

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1 Introduction

In interacting with companies and public authorities, people must carry out manifold administrative chores such as managing contracts, comparing offers, paying bills, renewing identity cards, registering cars, submitting tax returns, etc.^{1–4} This office-like, secretarial work is also referred to in the literature as cognitive household labor,⁵ household management,^{6,7} domestic bureaucracy, or life admin.^{3,8} Research in sociology and psychology shows that these activities are time-consuming, mentally, emotionally, and psychologically stressful, but crucial for financial well-being.^{3,5,9}

This work often overwhelms people; they cannot meet their obligations (e.g., payment deadlines) or need help claiming their rights (compensations, reimbursements, etc.). Issues like these can arise or worsen due to a lack of skills, illness, and mental and physical disabilities,¹⁰ increasing the risks of financial losses and over-indebtedness.^{11,12} As unpaid and undervalued work, it contributes to inequality for women as it is often unfairly distributed in the home.^{13,14} Besides a fair distribution of tasks in the household, supporting individuals with ergonomic tools and working environments is also crucial.¹⁵ A feminist call in literature demands to examine domestic work with the same care as the business context.¹⁵ The goal is to reduce physical and mental strain and increase individuals' well-being and productivity. Here, digitalization and thus professionalization of the household with properly designed technology can play a pivotal role in achieving these goals.³ Yet, despite the importance of people's financial well-being, the topic of domestic bureaucracy is under-researched in human-computer interaction (HCI).

Problem-oriented design approaches in information systems research and HCI, such as design thinking,^{16,17} design science research,¹⁸ design case studies,¹⁹ design sprints,²⁰ lean innovation,²¹ etc., involve, as a first step, an understanding of the current problem context through (pre-) studies before prototyping and testing solutions. By understanding the domestic working environment in both a narrower (e.g. regarding tools) and broader sense (e.g. regarding spaces), design implications can be derived.²²

Therefore, this study aims to guide researchers and practitioners with an overview of the domestic working sphere for designing ergonomic and efficiency-enhancing tools. In this way, one can become aware of current trends as well as socio-demographic differences by considering the needs of specific groups, such as those defined by gender, age, and other factors.

For this reason, we utilize a paid online survey with 617 socio-demographically distributed participants to address the following research questions:

RQ1: **Digitalization support:** Which tools (e.g., pen, paper, computer, smartphone, special apps) are used for administrative work at home?

RQ2: **Work context:** At which places do people complete their administrative work at home?

RQ3: **Inclusive design:** What socio-demographic differences exist regarding administrative work at home?

Our findings extend the primarily qualitative explored body of literature by quantifying it and providing a comprehensive overview of a large population. Additionally, the findings reveal differences in terms of gender, age, education, and income. This also leads us to discuss design implications from our study together with the existing literature.

2 Related work

2.1 Domestic admin work studies

Professional bureaucracies and administrations are significant topics in sociology, described by Weber^{23,24} as forming legal-rational authority and by Luhmann^{25,26} as communication between different systems. In recent decades, however, current research has increasingly discussed the effects of bureaucracy on private households and the administrative work it generates.^{3,5–7,27}

In the past, this kind of work has been often described as “household management”.^{6,7} In recent years, the term “life admin” has also become popular in Anglo-American countries, focusing on efficiently completing necessary bureaucratic tasks to maximize leisure time.⁸ This work includes various activities that recur among different authors, such as shopping planning, appointment management, financial management, work with authorities, insurance and pension provision, etc.^{3,5,6,9}

Besides doing physical chores such as cleaning, cooking, and washing, life admin activities are rather cognitive.^{3,5} In the past, this dimension of domestic work has been neglected in the literature as the work is invisible in two respects.^{10,28,29} First, managing and organizing a household

is predominantly cognitive, mental work. Unlike physical chores, which have visible and tangible outcomes, cognitive work happens mainly in the mind and does not produce immediate, observable results. Due to its intangible nature, this kind of work is typically underestimated or ignored.²⁸ Moreover, the time spent on this household work is challenging to quantify, as it is ubiquitous, fragmented, and often carried out in parallel with other activities.^{1,9} Yet, time-budget studies in the United States of America indicate that this work involves at least 1 h per week.² Other studies suggest that the amount is higher.^{1,9}

Second, like other household work, it represents unpaid labor, so it does not appear in any national gross domestic product statistics.³⁰ However, this does not mean that the work has no value. The value, therefore, refers to the hidden cost of a market economy,³¹ which stems from the costs of performing market transactions to satisfy household needs. These include *ex ante* costs, such as the effort required to search, compare, and evaluate offers, and *ex-post* costs to monitor contracts, submit claims to insurance companies, pay invoices, etc.³¹ The resulting bounded rationality in making optimal transaction decisions³² not only causes economic harm but also jeopardizes the financial well-being of individuals, as it weakens consumer sovereignty and creates the risk of information and power asymmetries.^{33,34}

Domestic studies, especially in the feminist tradition,^{13,29,35,36} emphasize the societal impact of domestic bureaucracy by highlighting how women and marginalized groups are disproportionately affected. On the one hand, the work is unequally distributed in the household.^{13,36} On the other hand, people with disabilities are often unable to master this kind of activity, affecting their financial and psychological well-being.¹⁰ For this reason, feminist researchers, such as Emens,³ argue for a fair workload between the genders, lean government, more efficient consumer protection, and better computer support for this kind of work.

2.2 Computer-supported work at home

To our best knowledge, the digitalization of domestic bureaucracy has not yet been systematically studied. Still, in HCI/Computer supported-cooperative work (CSCW), various qualitative-oriented research in the tradition of CSCW workplace studies has explored dedicated aspects of this topic, such as domestic money practices, private investment strategies, or using a domestic ordering system to coordinate household chores.^{15,37–46}

For instance, Dethier et al.¹⁵ have analyzed people’s practices in dealing with their invoices as an artifact to organize domestic bureaucracy. They uncovered various processing and archiving systems. In doing so, bureaucratic

work in the household is characterized as taking place in well-defined but highly individualized ways in different places in the household (study, kitchen/dining room, living room, etc.). These practices require and represent a well-developed bureaucracy literacy.^{15,47}

Several CSCW studies also investigated work with money at home. Studying money practices, Kaye et al.⁴⁸ have identified various tools and techniques used in different home places to manage finances, such as multiple paper systems like index cards, notebooks, diaries, or labeled file folders. Similarly, Vyas et al.⁴³ demonstrate how various tools and locations are used in financial management, such as notes on the fridge in the kitchen, calendars, and pinboards in the home office, and physical objects such as preserving jars in which money is budgeted.

The work of agencies that provide financial advice and support to people, as investigated by Verne and Bratteteig⁴ or Dolata and Schwabe,⁴⁹ shows that interaction continues to be dominated by working with paper, traditional work tools, and involves a variety of different communication media. Here, an understanding of a person's prevalence of current tools in market processes is crucial for designing innovative systems.⁴⁹ In this regard, HCI research constantly stresses the co-existence of digital and paper-based systems and techniques, which prevail despite many digitalization concepts, such as the paperless (home) office.^{15,48,50}

IS Researchers, such as Mitchell et al.,⁵¹ empathize with market innovation for consumer household technology, that consumers will use more and more a “set of tools” that empower them to accomplish market-driven household work. Innovative and intelligent media is seen here as an opportunity to overcome inefficiencies and reduce transaction costs for the people.^{51,52}

2.3 Working from home interferences

There is already a large body of knowledge in CSCW that has studied well-being and productivity aspects in traditional offices, as well as in working from home (WFH) for several decades, with increasing attention in recent years, especially due to the COVID-19 pandemic.⁵³

Whereby research under different terms like “telework” or “remote work” over a long period has consistently viewed WFH as positive, enhancing productivity and improving work-life balance.^{24,54,55} However, the strong increase in recent years has also led to findings on negative aspects, such as a lack of physical and mental separation between work and private life. As these are mixed in terms of space and time, WFH can lead to serious compromises and conflicts in the work-life negotiation on the other hand.^{53,56–58} Where workers

have enjoyed time savings by being able to do household chores, such as cleaning or laundering, at the same time as working, now the re-bundling of personal and business life creates an “always-on” feeling for people at home. This means that they are constantly on call and constantly mentally at work,^{53,59} which is the case for both paid and unpaid work at home.^{3,5,28} An extreme example is provided by Leshed et al.,⁶⁰ where the private household and the family business of farmers are all in one place.

Studies show that people try to reproduce their (business) workplace at home, whereby the home setting differs from household to household.^{59,61} In order to work in a pleasant place, people also design their working environment as a place where they feel comfortable, so that they, for instance, decorate it with flowers.⁵³

Some households already have separate spaces respectively rooms that they can use for WFH, others have still to create them.⁵⁹ Here, social inequalities arise insofar as not everyone in a shared household has their own desk or the facilities for a separate room. This led not least to the prominent examples that we saw in video calls during the COVID-19 pandemic when the children of work colleagues came into the camera's lens or interrupted meetings. Thus, people at home are often disturbed and interrupted in their office work by family members, which can lead to dissatisfaction and unproductivity.⁵⁹ Cho et al.⁵³ recommend creating a better work environment in which the workplace is a dedicated space that should be physically (if possible) or at least mentally (e.g. virtually) separated.

The considerable development of WFH has also led to the extensive introduction of various groupware to enable remote collaboration.⁵³ These developments in remote work have also resulted in positive aspects for people's household work in interacting with external organizations, so that authorities, service companies, etc. can now also make remote appointments and on-site appointments are no longer necessary.^{4,49}

2.4 Gendered technology and age groups

Feminist research emphasizes that technology has a profound influence on women's work – including the private sphere.^{62,63} Technology both positively and negatively shapes gender relations and is influenced by them. Traditionally, technologies have been developed for the Western, masculine world, which can contribute to existing gender inequalities.⁶² Gender stereotypes and roles may also be reflected and reinforced by technology, or gender-specific requirements can be neglected.⁶³

Concerning work design and work support, not only a feminist demand but also other socio-demographic factors

make it necessary to examine and design technology for specific differences. For example regarding money work studies with a focus on specific groups, Vines et al.⁴¹ found that older people more often use checks to track their spending and organize their finances. To just simply digitalizing money practices of older people can disturb the way they work and hinder financial collaboration.⁶⁴ Moreover, in a later study, Vines et al.⁴² emphasized the importance of technology when managing a low income.

2.5 Research gap

Research calls from a socio-economic perspective for reducing administrative work in private households, which, besides sociological studies, has also been studied as collaborative work within HCI and CSCW, focusing on tools and techniques used. Office work at home respectively for private work is a challenge for the design of productive, appropriate, and comfortable workplaces, which should fit the respective user characteristics.

However, empirical studies have primarily used qualitative methods, which means that future research should quantify these qualitative findings in a quantitative study of the prevalence of technology use and the work environment in the home.

3 Methodology

To pursue the motivated research gap, we have chosen a quantitative method for this study to create a solid empirical basis for further research and design work. We answered our research questions R1–R3 with the help of an online survey, where we queried 617 adult people in Germany about administrative housework and its digitalization.

3.1 Measures and procedure

The questionnaire comprises four sections: (1) For typical administrative tasks³ (such as governmental affairs, contract management, health and insurance issues, etc.), we asked about the tools commonly used (e.g., pen and paper, smartphone, computer, officeware, etc.); (2) Additionally, respondents were provided with a blank text field to list any additional software they use. (3) We further asked about the typical places^{15,43,48} where these tasks are performed (such as the home office, kitchen/dining room, living room, bedroom, etc.). (4) Finally, demographic data such as gender, age, level of education, and income were collected.

We pretested our questionnaire twice to increase validity. First, we asked 10 people to answer the questionnaire

while thinking aloud. Based on their feedback, we revised the questionnaire. The second version was completed by 60 people online. We analyzed the results for plausibility and made minor corrections. We used this final version to commission QuestionPro GmbH as a professional market research institute to conduct the study.

The online survey was carried out between October and November 2023. The respondents' participation was voluntary, and informed consent was given for anonymized data collection and analysis.

3.2 Sample and data cleaning

After a data cleaning, 617 (=N) participants completed the questionnaire. The participants' ages ranged from 18 to 85, with an average age of 46 (SD = 17.0). Regarding gender, 49.8 % were classified as female, 49.8 % as male, and 0.5 % (N = 3) as non-binary. The median level of education is a completed vocational training, and the median level of the stated household income is between € 1,200 and € 2,500 (see Table 1).

3.3 Data analysis

Before the data analysis, the survey data was screened to identify outliers, inadmissible, and incomplete data. Second, we used common descriptive and inferential statistical methods to evaluate the data.

Our descriptive statistics use percentages of frequencies for ordinal scales as well as means (M) and standard deviations (SD) as key measures of central tendency and variability of Likert scales. As the data approximates an interval-level distribution, we run an analysis of variance (ANOVA)⁶⁵ to test whether the differences between socio-demographic groups (gender, age, education, income) are statistically significant. For ordinal scales (places of work), we conducted the more robust Kruskal–Wallis (H-) test.⁶⁵ All tests were conducted using SPSS Version 29.0.1.0.

Regarding the open question of what special software is used, two researchers independently formed categories inductively following the qualitative content analysis methodology.⁶⁶ Then, we use standard descriptive statistics to analyze and summarize these categories.

3.4 Limitations

We conducted our study using an online panel, as a well-established and commonly employed method in the literature. However, as with all online panel studies, there are some general limitations to our study.

Table 1: Demographics of the sample.

Characteristic	Value	<i>N</i>	Percentage	Mean (SD)	Min	Max
Gender	Female	307	49.8 %	45 (17)	18	85
	Male	307	49.8 %			
	Non-binary	3	0.5 %			
Age						
Income	Not known	17	2.7 %	45 (17)	18	85
	<1.2 k€	87	14.1 %			
	1.2 k–2.5 k€	189	30.7 %			
	2.5 k–5 k€	250	40.6 %			
	>5 k€	74	12.0 %			
Education	School or lower	101	16.4 %	45 (17)	18	85
	Vocational education	361	58.5 %			
	University or higher vocation education	155	25.1 %			

Studies indicate that participants in such panels are often younger and more educated, which may affect the generalizability of the results.⁶⁷ As shown in Table 1, however, our sample does not have these characteristics.

Another potential issue is the proprietary nature of the participant recruitment process and compensation details of the online panel providers, which can lead to concerns about self-selection effects and potential biases.⁶⁸ Despite these concerns, prior research shows that online panel studies often produce results comparable to those obtained from more traditional samples, particularly in psychological and social domains.⁶⁷

A further limitation is the lack of control over the conditions under which participants complete the questionnaire, including timing, setting, and self-reporting. Additionally, the presence of incentives might prompt some participants to respond fleetingly or inattentively. To address this, besides the panel provider's quality checks, we also assessed the meaningfulness of responses to open-ended questions. Here, qualitative studies are able to overcome such biases. They have the advantage of an in-depth understanding of the context in which tools and locations are used, as well as understanding different scenarios and reasons, which a quantitative study cannot achieve. Previous qualitative studies, which have examined different working environments in specific cases, lack an overview of the population and its socio-demographic differences.

4 Findings

4.1 Tools used for admin work

With the category “work tools”, we refer to the various digital and physical resources that individuals use to manage,

organize, and complete administrative household tasks. We used a five-point Likert scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = very often) to evaluate which tools are used how frequently for diverse administrative tasks (see Figure 1).

We categorized the various work tools into four main groups: Devices, Officeware, Communication, and InfoAssistants.

Devices cover basic digital tools like computers and smartphones as well as analog tools like paper-based file folders and pen and paper. Officeware encompasses general office software for organizing and managing tasks, such as calendars, word processing programs, and spreadsheets. Communication refers to tools used for information exchange, including email, telephone calls, chat, and video calls. Lastly, InfoAssistants are tools used for information access and AI assistance, highlighting the role of search engines and the emerging use of chatbots in managing administrative household tasks.

In the following, we discuss these four main categories in more detail:

4.1.1 Devices

Administrative work is often called ‘paperwork’, underscoring the historical reliance on pen and paper as the primary tools.^{15,43,48}

Our survey, however, shows that this is currently changing. Although pen and paper ($M = 3.25$; $SD = 1.17$) and file folders ($M = 3.28$; $SD = 1.23$) remain important, our findings indicate a slight tendency towards the use of digital devices such as computers ($M = 3.36$; $SD = 1.27$) or smartphones ($M = 3.31$; $SD = 1.3$). This means there is no clear preference but rather a coexisting of digital and analog tools in households.

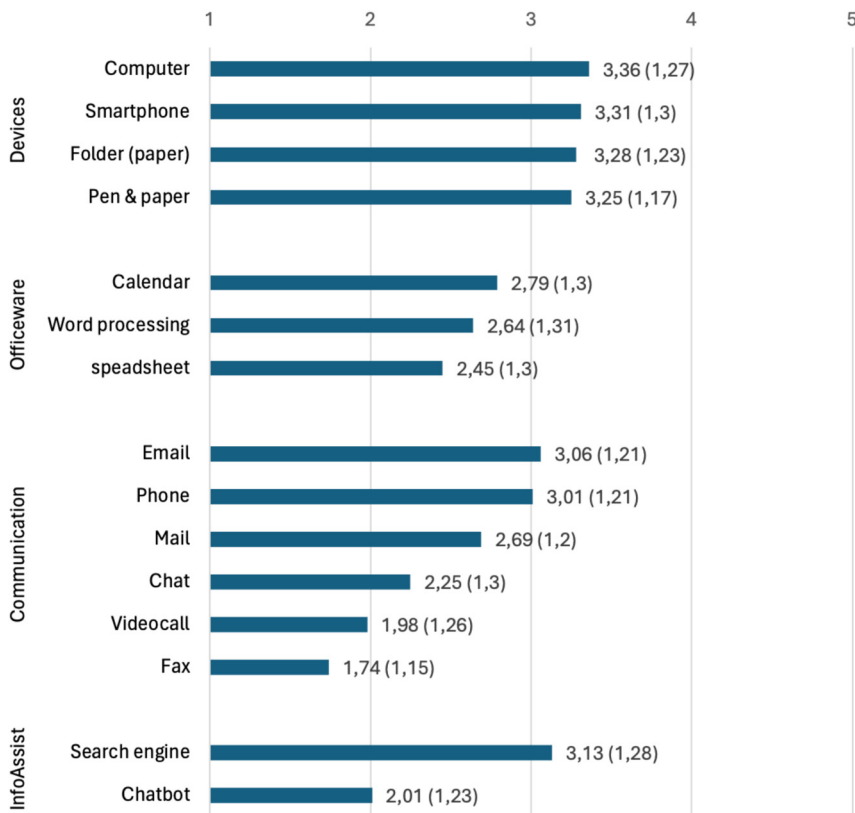


Figure 1: Frequencies of tool usage (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = very often. Numbers on the bars present mean and standard deviation).

4.1.2 Officeware

Officeware like Microsoft Word, Google Docs, and LibreOffice are pivotal in professional administrations. Our study shows that this also applies to the private sector to a certain extent.

A closer look reveals that the usage frequency of the various programs within an office suite is quite different. The respondents most often used the calendar for coordination and organizational work ($M = 2.79$; $SD = 1.3$). Tools for word processing ($M = 2.64$; $SD = 1.31$) or spreadsheets ($M = 2.45$; $SD = 1.3$) are only used rarely to sometimes. The answers in the free-text field provide a valuable impression of which office suites are commonly utilized in the home context. Most often, people mention using Microsoft Word ($N = 21$), Excel ($N = 15$), Google Docs ($N = 7$), and Outlook ($N = 5$). Other tools mentioned include Microsoft Office as a whole suite ($N = 2$), Open Office ($N = 2$), Libre Office ($N = 2$), and Apple's iWork suite ($N = 2$).

4.1.3 Communication

Administrative work is not just cognitive but involves a lot of communicative work. Customer service must be

contacted in case of problems or questions, appointments are arranged by phone or email, friends and family members are asked for advice or to coordinate activities, etc.

Our survey also demonstrates the importance of communicative work. The results show that communication tools are as important as Officeware for domestic administrative work. E-mail ($M = 3.06$; $SD = 1.21$) and telephone calls ($M = 3.01$; $SD = 1.21$) were the most frequently used tools. Chat ($M = 2.25$; $SD = 1.3$) and video calls ($M = 1.98$; $SD = 1.26$) were used less frequently. Our results further show that some people still use the quite outdated technology of fax machines, although they are rarely used ($M = 1.74$; $SD = 1.15$). Communication tools mentioned in the free-text field were Outlook ($N = 5$), Microsoft Teams ($N = 3$), and Slack ($N = 1$).

4.1.4 InfoAssistants

Rational market decisions require consumers to search for the available options, obtain product information, and evaluate the information's quality and trustworthiness.⁶⁹ Besides communicative work, information work is thus an essential component of domestic administrative work. With

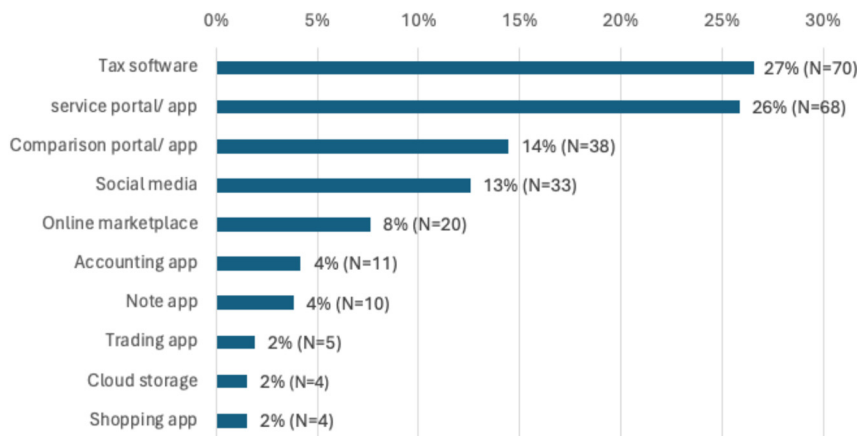


Figure 2: Frequency of special software usage (the numbers on the bars indicate the relative (%) and absolute frequency (N)).

the internet and information assistance tools, this work has dramatically changed with digitalization.⁷⁰

The importance of these tools is also evident in our survey. The search engine was the most frequently used tool (running on a computer or smartphone) ($M = 3.13$; $SD = 1.28$), indicating a certain need for search/research by people performing bureaucratic work in the household. In contrast to the hype around ChatGPT and the chatbot tsunami in academia,⁷¹ chatbots are only rarely used for administrative household work so far ($M = 2.01$; $SD = 1.23$). This is also reflected in the InfoAssistants tools named in the free-text field, where Google ($N = 71$), Bing, or Yahoo ($N = 2$) are more often mentioned than chatbots like ChatGPT ($N = 3$), Steuerbot ($N = 3$), or Alexa ($N = 1$).

4.2 Special software

In addition to these main categories, the free-text responses indicate a long tail of special software people use for their administrative work at home. Overall, the use of special tools is mentioned 263 times in the free text field. Among others, the most mentioned were Elster ($N = 31$), Check24 ($N = 16$), WISO Steuer ($N = 14$), Whatsapp ($N = 12$), Taxfix ($N = 6$), Instagram, ($N = 6$), Facebook ($N = 6$), Doctolib ($N = 5$), Clark ($N = 2$), or Trade Republic ($N = 2$). While each tool presents a niche, collectively, they make up a significant portion of the tools used for domestic administrative work.

By using qualitative content analysis, we have split them into ten categories (cf. Figure 2). Thereby, tax software ($N = 70$) is the most frequently mentioned category, in which products such as Elster ($N = 31$), WISO Steuer ($N = 14$), and Taxfix ($N = 6$) are named. After that, portals/apps ($N = 68$) from companies, service providers, and

governments are utilized for personal administrative work. These include Online Banking ($N = 10$), Health Insurance Apps ($N = 10$), Company websites ($N = 8$), and Government websites ($N = 3$).

Comparison portals ($N = 38$) present another important category. These platforms play a crucial role in helping users make informed decisions by providing comprehensive comparisons of products and services across various sectors. Examples mentioned by the participants were Check24 ($N = 16$) and Idealo ($N = 2$). In addition, our survey indicates that online marketplaces ($N = 20$) are not just used to buy products; people use them similarly to comparison portals to find and compare products.

We were somewhat surprised by the frequency with which participants identified social media as a tool for private administrative work ($N = 33$). Despite not being designed initially for administrative tasks, consumers may leverage these platforms to gather information, search for consumer goods, and discuss administrative matters. In addition, social media commerce has become popular in recent years,⁷² where these platforms are used to buy/sell goods and services. In our survey, Instagram ($N = 6$), Facebook ($N = 6$), TikTok ($N = 3$), and YouTube ($N = 3$) were the most mentioned social media platforms used in the context of administrative work.

Further software and apps mentioned are used for Accounting ($N = 11$), Note-Taking ($N = 10$), Trading ($N = 5$), Cloud Storage ($N = 4$), and Shopping ($N = 4$).

4.3 Places used for admin work

As usability engineering has demonstrated, not only the tools but also the work environment play a crucial role in ergonomics.²² In the corporate context, for instance,

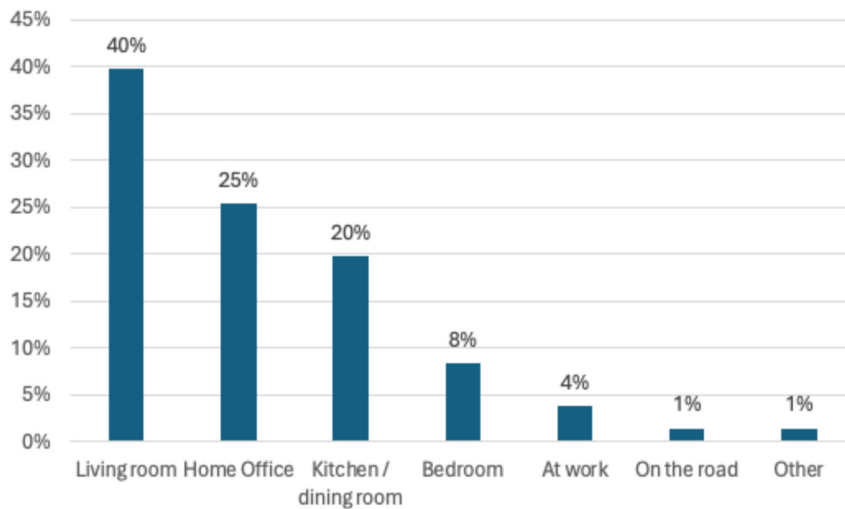


Figure 3: Places where people do admin work.

Table 2: Socio-demographic differences across devices, workplaces, InfoAssistants (ANOVA was used for devices, Kruskal–Wallis (H) test was used for workplace).

Use of	Gender			Age			Education			Income		
	<i>F</i>	<i>p</i>	η^2	<i>F</i>	<i>p</i>	η^2	<i>F</i>	<i>p</i>	η^2	<i>F</i>	<i>p</i>	η^2
Pen & paper	0.104	0.747	0.000	3.863	0.021*	0.007	1.761	0.172	0.003	0.054	0.984	0.000
Folder	4.206	0.041	0.004	0.882	0.414	0.002	1.225	0.294	0.002	3.053	0.028*	0.008
Computer	20.003	< 0.001**	0.017	1.427	0.240	0.003	11.642	< 0.001**	0.020	4.336	0.005**	0.012
Smartphone	4.555	0.033*	0.004	64.664	< 0.001**	0.103	7.954	< 0.001**	0.014	2.216	0.085	0.006
Searchengine	1.090	0.297	0.001	53.384	< 0.001**	0.086	8.087	< 0.001**	0.014	4.682	0.003**	0.013
Chatbot	0.159	0.690	0.000	102.924	< 0.001**	0.154	21.385	< 0.001**	0.036	4.795	0.003b**	0.013
Prevalence of	Gender			Age			Education			Income		
	<i>H</i> -test	df	Asymp.Sig.	<i>H</i> -test	df	Asymp.Sig.	<i>H</i> -test	df	Asymp.Sig.	<i>H</i> -test	df	Asymp.Sig.
Work-place	6.305	1	0.012*	12.206	2	0.002**	10.208	2	0.006**	14.322	3	0.002**

Note: High resp. low values are marked in bold. *: $p < .05$; **: $p < .01$.

regulations like the German ordinance “BildscharbV”¹ mandate that employers ensure that office work environments adhere to ergonomic standards. This does not hold for the home setting. Therefore, it’s crucial to understand where domestic administrative chores are usually performed.

From an ergonomic standpoint, a well-equipped home office would be the preferred workplace. Yet, our survey (see Figure 3) shows that the primary place for domestic office work is the living room (40 %) alongside the Kitchen/Dining room (20 %) and Bedroom (8 %). For only 25 % of the participants, the home office is commonplace

for domestic office-like work. Other places, such as the employer’s workplace (4 %) or on the road (1 %), are rarely mentioned.

4.4 Socio-demographical differences

Previous research shows that socio-demographic factors impact the temporal workload.^{2,9,10,13} We also identified some socio-demographic differences in the prevalence of places and tools (see Table 2).

In the following, three interesting categories are compared: (1) Devices, as they show the degree of digitization and the basis technology on which work takes place and officeware or communication services run. (2) InfoAssistants, as they provide insight into the current use of search and innovative (AI) assistants. (3) Workplaces, as they provide an insight into the domestic working environment of

¹ Ordinance on Safety and Health Protection at Work with Visual Display Units (Bildschirmarbeitsverordnung – BildscharbV) of December 4, 1996, last amended on January 29, 2001 (German Federal Law Gazette I p. 1841, 2,785, 2,865).

Table 3: Mean values & SD in differences for devices and InfoAssistants (non-statistically significant figures were left out for overview reasons; age groups: young adults: 18–29; adults: 30–62; elderly: >62).

Demographics	Pen & paper Mean (SD)	Folder Mean (SD)	Computer Mean (SD)	Smartphone Mean (SD)	Search engine Mean (SD)	Chatbot Mean (SD)
Gender						
Female			3.19 (1.27)	3.39 (1.25)		
Male			3.52 (1.23)	3.23 (1.35)		
Age						
Young adults	3.08 (1.1)			3.83 (1.01)	3.65 (1.24)	2.75 (1.31)
Adults	3.29 (1.18)			3.35 (1.26)	3.13 (1.26)	1.93 (1.16)
Elderly	3.33 (1.2)			2.58 (1.4)	2.52 (1.26)	1.33 (0.74)
Education						
School or lower			3.21 (1.23)	3.64 (1.09)	3.46 (1.24)	2.25 (1.33)
Vocational edu.			3.26 (1.27)	3.21 (1.33)	3.03 (1.28)	1.83 (1.1)
University/higher vocation education			3.66 (1.22)	3.35 (1.31)	3.18 (1.3)	2.33 (1.37)
Income						
<1.2 k€		3.24 (1.15)	3.32 (1.21)		3.19 (1.18)	2.25 (1.27)
1.2 k–2.5 k€		3.13 (1.26)	3.23 (1.29)		2.99 (1.34)	1.91 (1.2)
2.5 k–5 k€		3.39 (1.2)	3.41 (1.26)		3.15 (1.28)	1.99 (1.21)
> 5 k€		3.31 (1.34)	3.66 (1.18)		3.46 (1.22)	2.28 (1.4)

Note: High resp. low values are marked in bold.

different groups and guide the ergonomic design of work equipment.

4.4.1 Gender

Regarding work devices, our study shows significant gender differences in the use of computers and smartphones (see Table 2).² While men use computers more frequently, women use smartphones as their primary device for admin work (see Table 3).

Also, significant differences exist regarding the workplace. While both prefer the living room, making use of the home office or bedroom is slightly higher in the case of men. Instead, women rather use the living room or do it at work (see Table 4). The other locations were chosen with equal frequency for both genders.

4.4.2 Age

In the case of age differences, we measured by far the highest effect sizes, which are found in the use of smartphones, search engines, and chatbots (F -values; see Table 2). Here, our findings unsurprisingly show that younger individuals

exhibit a higher degree of digitalization. This is particularly true when using Smartphones, search engines, or chatbots for domestic admin work (see Tables 2 and 3). The use of pen and paper is also significantly lower among younger people than older people.

Age also has a significant impact on the used workplace, with younger people more likely to work in the bedroom and older people most likely to work in the home office (see Table 4).

4.4.3 Education

Our results show that people with a higher degree of education use computers more frequently than people with a lower degree of education, who are more likely to use smartphones. The use of search engines and chatbots is highest among people with low levels of education and second highest among people with the highest levels of education. Chatbots are most used by people with higher levels of education and second most used by people with the lowest. These differences can also be explained by age differences, with younger people having lower levels of education as they are still in their training. However, it is conclusive that a high need for knowledge of household bureaucracy leads to a higher use of search engines among younger people and people with low levels of education. Younger and well-educated people are most likely to be supported by AI in their cognitive housework.

² Only three participants in the sample stated that they were non-binary. As this small number can lead to distortions, we have excluded this group from the analysis of gender differences for statistical reasons.

Table 4: Percentages in differences for workplace (values in % of each line).

Demographics	Workplace						
	Living room	Home office	Kitchen/dining r.	Bedroom	At work	Road	Other
Gender							
Female	42.3	21.2	19.9	0.09	4.8	1.6	1.3
Male	37.3	29.6	19.6	7.7	2.9	1.3	1.6
Age							
Young adults	33.8	22.8	17.2	17.9	5.5	2.8	0
Adults	43.1	24.0	19.9	5.8	4.3	1.2	1.7
Elderly	36.5	33.3	22.2	4.8	0.8	0	2.4
Education							
School or lower	34.0	17.5	23.3	16.5	5.8	1	1.9
Vocational education	44.4	21.8	21.5	6.6	2.5	1.7	1.7
University or higher vocation education	33.1	38.9	13.4	7.0	5.7	1.3	0.6
Income							
<1.2 k€	33.3	16.7	27.8	5.6	11.1	5.6	0
1.2 k–2.5 k€	44.3	13.6	20.5	12.5	4.5	0	4.5
2.5 k–5 k€	49.5	17.4	22.1	6.8	1.6	1.6	1.1
> 5 k€	34.1	32.1	18.7	8.7	4.4	1.6	0.4

Note: High resp. low values are marked in bold.

We also see significant workplace differences (see Table 4). People with a low level of education were more likely to use the kitchen/dining room or bedroom for a workplace, people with vocational training used the living room, and people with a higher level of education were most likely to use the home office. The simplest explanation for these differences can be found in the available budget and housing situation, for example, whether one has a home office or not.

4.4.4 Income

Indeed, income also has a significant influence on the preference for the workplace, but also a slight influence on the choice of devices and InfoAssistants (see Table 2). People with higher incomes use computers and file folders more frequently than people with lower incomes. In the use of InfoAssistants, we see that people with higher incomes most frequently utilize search engines and AI chatbots to accomplish administrative household work. For chatbots, we also observe a high level of usage among people with lower incomes, as this – again – can be explained by factors such as age, with younger people more likely to use AI chatbot tools.

The effect of income on the workplace is as already mentioned: a lower income leads to work in the (1) living room, (2) kitchen/dining room, or (3) bedroom, a higher income may allow to utilize a home office.

5 Discussion

We have responded to the socio-economic literature's request to investigate the use of technology (RQ1) and the domestic environment (RQ2) as well as socio-demographic differences (RQ3) in administrative household work. We operationalized implications from qualitative literature, conducted a large quantitative survey using a paid sample, and analyzed valid data (e.g., verified by two pre-tests). Therefore, our study contributes as a first step to support design by understanding the context of administrative household work and identifying important socio-demographic differences among the people.

The following discussion reflects the results of our study together with the findings from the existing (mainly qualitative) literature. It concludes with an overview of selected design implications for researchers and practitioners (see Table 5).

5.1 Working environment matters

As the literature already indicates, work and leisure areas are mixed physically or mentally in the household.^{1,3,43,48,53,57,58} We quantify to which extent administrative household work takes place in the leisure sphere and, therefore, spatial areas that have not been professionalized or ergonomically designed for office-like activities, such as the living room, kitchen/dining room, or bedroom.

Table 5: Overview of selected design implications.

Topic	Design implications
Leisure sphere	<ul style="list-style-type: none"> – Design should prioritize mobile support for household services in informal environments like sofas or kitchens. – Design should consider possibilities of mentally separating cognitive housework from leisure time and space, for example by disabling notifications for reminders, emails, etc., at certain times or places.^{53,59} – Design should provide concepts to create (virtual) dedicated work environments within different leisure areas in daily life.⁵³
Various standard tools & dedicated software	<ul style="list-style-type: none"> – Solution design should not only include general officeware but also enable the development of specialized software for specific use cases.^{15,51} – Design should take into account the simultaneous presence and use of different communication channels and media (e-mail, phone, mail, chat, etc. as well as web portals).^{4,15,49}
Age	<ul style="list-style-type: none"> – Design should not neglect older people or those who prefer paper-based work by digitalizing important customer or citizen interactions without any alternative.^{15,41,64}
Gendered technology	<ul style="list-style-type: none"> – Design should address gender differences regarding preferred work environment (such as the living room), preferred devices (rather smartphone than PC), etc.^{62,63}
Literacy tools	<ul style="list-style-type: none"> – Design should increasingly promote and optimize tools that aid in knowledge access, comparison, and search.^{15,33,47}
Weaker consumer groups	<ul style="list-style-type: none"> – In this context, appropriate technology offers the opportunity to empower vulnerable consumer groups through innovative, conversational or search-based tools.^{33,42}
Early adopters	<ul style="list-style-type: none"> – Designing new, innovative tools should target young, well-educated people first. – The design should be careful about disrupting the practices of older people (as mentioned above), but also the middle class (middle income; middle education level)

Our results provide a reliable picture of the distribution of work and work artifacts in people's homes, confirming that leisure areas overlap or mix spatially as well as inevitably mentally.

As we measured, many people do not have a separated home office space for household work and instead work at their desks in the kitchen/dining room or on the couch in the living room, like due to income differences. Furthermore, the pleasant and comfortable atmosphere of the living area could also play a role in the choice of workplace.⁵³

The choice of the location combined with work tools indicates that women are more likely to work on a smartphone and in the living room, whereas men are more likely to use a computer and work in a home office. Thus, our study makes an important and clear contribution to research on gendered technology, which calls for gender-equitable and appropriate work support.^{62,63}

HCI design should consider heterogeneous spatial conditions – especially those of the living room – to the extent that bulky desktop PC applications should be avoided and convenient, flexible working on different devices in different locations should be strongly considered in the design.

However, the differences measured between the genders may be caused by another common factor, such as the different division of responsibilities and task-typical differences in the prevalence of technology and location, such as creating shopping lists versus managing contracts.

5.2 Admin tools are more than officeware

From the literature, it is already known that digital and paper-based systems must coexist,^{15,43,48,50} but we have quantified that the use of paper is not only relevant but is nearly equal to or only slightly behind the use of digital tools. This means once again that the paperless home office remains a myth.⁵⁰

The most frequently used tools are communication tools (such as email, telephone calls, etc.) and research tools (such as search engines). We interpret this to mean that communication makes up a significant part of the work and that there is a strong need for “bureaucratic literacy”, which search engines, and possibly increasingly AI chatbots, can support. Although chatbots are rarely used due to their younger existence, they are well-represented compared to other media, especially among younger generations or higher income and education levels.

As the increasing use of groupware for WFH⁵³ and collaborative work of agencies shows,^{4,49} we are also observing in the case of specialized software that most of the special software is used for interaction, communication, and research. They are used, for example for the cooperation with tax authorities (Elster, WISO Steuer, Taxfix) and private companies (check24, online banking, health insurance, company website/portal, Doctolib). Here, people are adopting an extensive and heterogeneous “set of tools” by

carrying out various organization-oriented bureaucratic tasks.^{9,51} For example, social media (Instagram, Facebook, YouTube, TikTok) also play a role in this work. Nevertheless, mentioning special software should not be considered a real-valid distribution, as we did not explicitly ask about this. However, they are interesting insights that may correlate with the real distribution. Following studies can verify this.

5.3 Designing for heterogeneity

Differences in age regarding innovative technologies are mostly unsurprising, although other differences have exciting implications.

According to our results, higher educated and higher income earners are more likely to use computers, whereas less educated and lower income earners use smartphones. This may be related to the separate workspace at higher income households and working in the living room for lower-income households or, as discussed with gender differences, to another common factor of different task specifics. Nevertheless, we can conclude that when designing solutions for weaker consumer groups, e.g. for education, information, comparison, etc., we should focus on smartphone technology and the living room as a workspace. With the higher usage of search engines among younger and less educated people, we conclude that properly designed technology can help low-income groups with financial management and empower their financial well-being.⁴² In this context, search engines and chatbots can play an important role in providing access to “bureaucracy literacy”.^{15,47} Regarding innovative AI chat assistants, we provide in the context of administrative household work groups of early adopters to design for at first. These early adopters are young, highly educated, or currently in education, with either high or low incomes, representing a milieu of expedites and performers.⁷³

These considerations allow us to derive the following user groups, which are not disjoint entities and may overlap:

5.3.1 Stationary users

The typical image of an office at home for office-like tasks is the desk at home with a computer, telephone, printer, etc. However, this was rarely observed among all participants, it is more the case for male persons, persons with a high degree of education, or persons with a higher income. This group of users are more likely to use stationary and rather professionally equipped computer workstations, whereby higher incomes also more include paper-based proper filing systems.

5.3.2 Mobile users

This user group tends to work in different working environments in the household, which are distributed through the private sphere and are also characterized by a non-specialized setup. This was “the normal case”, especially for women, younger people, or people with a lower level of education. Thus, mobile working environments should be facilitated here.

5.3.3 Innovative users

Some users like to use intelligent (search) assistants, which can make work easier and increase efficiency. Young, well-educated people or people with high or low incomes may represent a set of early adopters.

6 Conclusions

In this article, we have explored what the domestic spatial-technical workspace in the German population currently looks like for administrative household work. We presented and discussed an overview of the digitalization of domestic bureaucracies (RQ1), the common workplace for this kind of work (RQ1), and their socio-demographic differences (RQ3).

HCI design should consider the heterogeneous workplace structure, especially that of the living room, and find out which devices and assistants are best suited for each user group or task. It is also important to still consider the coexistence of digital and paper-based tools. Communication and research technology are particularly important for accomplishing this work and, when properly designed, may help to empower weaker consumer groups.

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