SO MANY COMPUTERS, WHICH ONE TO USE? - AN EXPLORATORY STUDY OF USER PREFERENCES

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ABSTRACT

In this exploratory study we map the preferences that affect the use of five of the most common Information and Communication Technology devices: desktops, laptops, netbooks, tablets and smartphones. We grouped the preferences into categories, such as performance, mobility, accessibility, applications and entertainment. The list of items in each category was developed based on past surveys and informed by results from the TAM literature. We found that the categories can be further refined with additional factors. Our sample from a tech-savvy and experienced user population could be divided into 6 distinct clusters based on their preferences for the different items. We also observed patterns in the parallel usage of multiple devices.

INTRODUCTION

Information and Communication Technology (ICT) devices went through enormous changes in the past two decades. The progress in increasing performance and decreasing size and weight resulted in the emergence of a variety of devices, such notebook computers, netbook computers and tablet computers. Similarly, wireless telephones have emerged that serve a lot broader array of needs than voice communication. As a result of the convergence of these devices, it is possible to look at them as substitute products.

In this study we set out to explore the reasons why people choose to use one or more of these devices. We relied on past surveys and theory to design a questionnaire that provided us with data to analyze preferences that drive users' decisions in selecting from the available category of devices. We also looked the amount of time customers use these devices and how the preferences of the users affect the time spent with different devices. For this study we considered the following device categories, or as they are commonly referred in the industry, form factors: desktop computers; portable computers, which we divided into two categories: laptops (which are larger and capable of running computation intensive applications) and netbooks (where the screen size is smaller than 10 inches, the weight is below 2.5lbs and are in general not suitable to run substantial, computation intensive software); tablets [4]. We added smartphones to this list of devices. Our goal is to better understand the preferences that lie behind these changing trends.

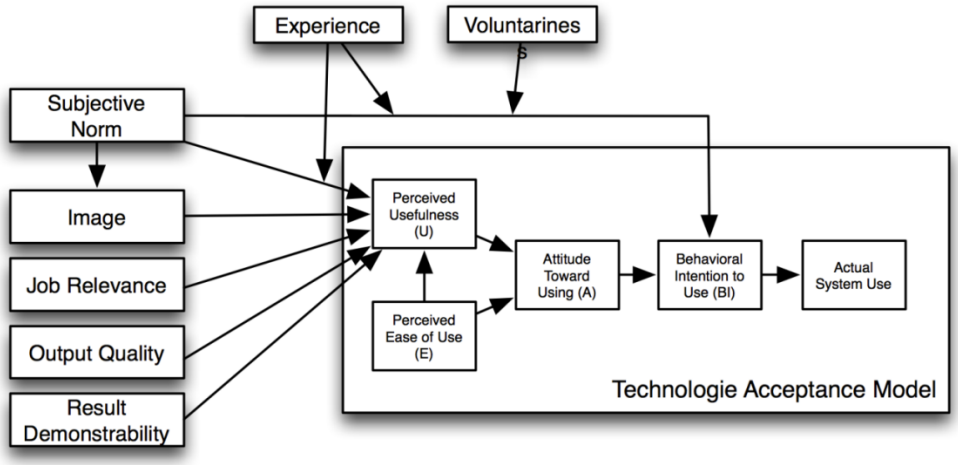
LITERATURE REVIEW

The devices in our focus all belong to mature groups of technologies. Desktops first appeared in the 1970s (Apple II in 1977) and started to become ubiquitous with the appearance of the IBM PC in 1982 [5]. Portable computers have also been around for well over 20 years with IBM's ThinkPad laptop line introduced in 1993 [5]. While it can be argued that netbooks are only a subcategory of laptops, they became quite common in the 2000s when it became possible to manufacture smaller, lighter devices that were still capable of providing reasonable user experiences [2]. The most prominent examples of smartphones and tablets were by Apple, in 2007 and in 2010, respectively [2].

Davis introduced the Technology Acceptance Model with the purpose of predicting system use by perceived usefulness and perceived ease of use [1]. The context of his investigation was employees' attitude towards technology adoption in large corporate environments. Over the years numerous improvements and augmentations of the original model was proposed in a variety of settings and contexts. For the design of our study, we relied on the model developed for TAM2 [6] [7]. For the visual representation of the mode see Figure 1. This model includes constructs for voluntariness, experience, subjective norm, image, job relevance, output quality, and result demonstrability. While the main context is still employees' attitude in a corporate setting, the added constructs can be relevant in other environs. These constructs could readily be adapted for our research goals, context and targeted population.

FIGURE 1.

The TAM2 Model



RESEARCH METHODOLOGY

The study's goal is to gain some understanding of preferences in their selection of ICT devices. We sampled from users who are considered tech savvy and are open to new ideas, products and technologies. Furthermore, they can be considered experienced users of at least some of the ICT devices so they do not need to face the hurdle of a steep learning curve. We chose to collect our survey data from young university graduates and their acquaintances [3]. Respondents, most of who were enrolled in

business, economics or information systems oriented post-graduate studies at a major Easter European university, were asked to anonymously fill out an on-line survey questionnaire.

For preference questions the respondents were asked to rate the importance of features and capabilities. Many features and capabilities for the questions were assembled based on questions applied by the survey companies listed in the literature review. Many questions were adapted from the instruments of TAM2 used by [7]. We omitted some constructs and questions related to them while some additional questions deemed relevant and important were added. The original questions were adapted to match the context of the study and the targeted population. Questions related to preferences utilized a 7 level symmetric Likert scale.

After discarding incomplete and unusable records we ended up with a sample size of n=130. 56% of the respondents were female, 44% were male. The range of the respondents' age was between 21 and 32 years, with an average of 24 years. 85% of the sample already had a Bachelor's degree and most of them were actively seeking a postgraduate degree (mostly Master's, 63%, but also a few Ph.D.'s). 10% had Master's degrees. 83% of the respondents defined their background as urban/suburban.

DATA ANALYSIS AND DISCUSSION

We grouped the user preferences into 6 categories: usability, mobility, accessibility, applications, entertainment and other. For each category an index value was determined based on the responses expressing the level of importance of its subcategories. The category of *usability* included performance; storage capability; connectivity; work-relevance; e-mail; and the ability perform e-business related tasks. *Mobility* was determined by device weight and size; time to boot up and shut down the device; integrated features; and convenience. The *accessibility* category comprised of device capabilities to support Wi-Fi or 3G phone communications systems; voice and/or data communication; video calls; and chat capability. The *applications* category included the tools like GPS maps; calendar; notebook; action to-do lists; and the ease of use of the apps. The *entertainment* category grouped together games; movies; music; video clips; and general browsing. The *other* category included image; design; availability of touchscreen; and general innovativeness. Factor analysis indicated that the questions related to the categories can be reduced. For every category, a score was calculated based on the respondents' preference levels for the items in the factor. We identified six clusters by using the cluster elbow method for cluster analysis. The average category scores for the 6 clusters are shown in Figure 2. The first cluster could be referred to as *uninterested users*: they score fairly low for each and every category. *Middle of the road users* are similar with the exception that they value entertainment features of their devices quite highly. For *trendy entertainment consumers*, the second largest group with n=25, mobility, availability of applications, and entertainment options are all very important. The largest group with n=32 is the *work focused* group of users: they value performance only. *Travelling crunchers* consider both performance and mobility highly desirable. Finally, the *travelling warrior* group differs from the travelling crunchers in which accessibility is even a bit more important than performance and mobility.

FIGURE 2.

The six clusters

Clusters, Preference Scores	**Usability**	**Mobility**	**Accessibility**	**Applications**	**Entertainment**
Uninterested users (n=22)	82	83	75	*50*	*58*
Middle of the road users (n=11)	80	81	75	*60*	**95**
Trendy entertainment consumers (n=25)	93	**97**	82	**96**	**110**
Work focused (n=32)	**96**	86	75	81	78
Travelling crunchers (n=14)	**103**	**96**	85	*38*	79
Travelling warriors (n=26)	**103**	**101**	**108**	*62*	85

For the prediction of actual device usage based on the calculated category scores we present a brief set of logit regression equations (Table 1; only the significant variables are included in the equations). For the users of desktop computers, neither design and chat capability are not important (the actual coefficients for these variables are negative.) On the other hand, preference for games is a significant variable. It makes sense considering how serious gamers are focused on the performance of their desktops. The significant variable with positive coefficient for laptop usage is design: one wonders the influence from Mac users in this prediction. Other notable significant variables with positive coefficients are the chat availability for netbook usage, the availability of a good app store for tablet users and the triple important factors of design, social media and telephone for the smartphone. This last result nicely coincides with the common wisdom applied to the use of smartphones, according to which the trendiness of the design is just as important as the presence of social media tools along with phone capabilities.

TABLE 1.

Logit regression equations (only the significant variables are included)

Desktop Usage = 0.78 - 0.116 (Design) - 0.085 (Chat) + 0.079 (Games)
Laptop Usage = 0.905 + 0.092 (Design) – 0.05 (Social Media) – 0.049 (E-book Reading)
Netbook Usage = 0.324 - 0.087 (AppStore) + 0.077 (Chat)
Tablet Usage = 0.436 +0.076 (AppStore) – 0.081 (InputDevice)
Smartphone Usage = -0.457 + 0.137 (Design) + 0.082 (Social Media) + 0.074 (Telephone)

Many users use more than one type of device regularly. With the ongoing proliferation of smartphones as the primary voice communication device, it is quite common to use them along with another computing device. From the correlations between the uses of the different devices only 3 were significantly different from zero: the correlation between the uses of laptops with tablets (.242) and smartphones (.253), and between tablets and smartphones (.206). For a better overview of the regular usage of two devices, we prepared these cross-tabulated contingency tables. First, for everybody in the sample, we coded the device usage hours per week into 4 categories: 0 hrs. (no use at all), 1-10 hrs. (little use), 11-40 hrs. (significant use) and 41+ hrs. (extensive use). Then we could observe the number of users in the contingency table for all pairs of devices. Two of these contingency tables are included below. Table 2 compares the use of desktops and laptops. It shows that the largest value cell is the one referring to people (n=50) who do not use desktops at all but their laptop use is significant. In fact, the Total column for desktop use reinforces the common wisdom that lately the computing performance of laptops has reached a level where the difference between them and desktops is not relevant to the vast majority of users. As a consequence, almost 64% of users (n=83) in the sample do not use desktops at all, while more than half them, 52%, (n=68) are significant users of laptops.

TABLE 2.

Contingency table for Laptop and Desktop usage

		Laptop (hrs./wk.)				Total
Count		0	1-10	11-40	41+	
Desktop (hrs./wk.)	0	6	13	50	14	83
	1-10	3	9	11	2	25
	11-40	5	3	7	0	15
	41+	1	4	0	2	7
Total		15	29	68	18	130

TABLE 3.

Contingency table for Tablet and Smartphone usage

		Smartphone (hrs./wk.)				
Count		0	1-10	11-40	41+	Total
Tablet (hrs./wk.)	0	15	25	13	2	55
	1-10	2	25	16	3	46
	11-40	2	10	8	6	26
	41+	0	0	1	2	3
Total		19	60	38	13	130

The other informative contingency table is the one comparing the use of tablets and smartphones (Table 3). While tablets are not used quite as frequently (42%, n=55 does not use them at all; possibly because

it is the newest device category with the first introduction of the iPad in 2010), smartphone usage is very common 85% (n=60+38+13=111), with 46% (n=60) using it a little and 29% (n=38) using it significantly. The most populous cells are where 19% (n=25) of the users use the smartphones a little and use tablets either roughly the same amount of time, a little, or not at all.

CONCLUSIONS

We performed an exploratory study with the goal of better understanding what motivates people to use one or another Information and Communication Technology device from the broad categories of desktops, laptops, netbooks, tablets and smartphones. Our survey allowed us to step beyond the typical industry overview of device usage by incorporating lessons learned from theoretical models. Targeting a digitally savvy population for our investigation also let us focus more on the characteristics of the devices and the preferences of the observed population on when and how to use these devices, and less on demographical factors moderating device usage.

Analysis of the results showed that there are significant relationships between preferences and the usage of certain devices. The insights gained can be used to personalize device offerings to specific customers. Learning the preferences of users groups can help device developers to choose between features to design into a device to make it more appealing to the specific user groups. Relationships between the usages of different devices can benefit marketers and sellers of ICT devices to create attractive bundles of goods and services. A weakness of the study stems from the original narrow focus on young, highly educated users. Other user groups will need to be studied for possible broader generalizations. Also, the sample size was suitable for our exploratory study but for deeper theory development a larger sample size is also necessary. More details from different user and demographic groups will also be needed for more useful guidance for sellers and marketers of ICT devices and services.

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