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The judgment of product features: User preferences for choosing a smartphone among higher education students

The mobilization boosts the completion of the information society. A smartphone became the primary hardware for running the related services. However, standardization of the services and systems is remarkable; there is a wide range of device features available. The evaluation of user preferences about smartphone features may support the development of the design of both the hardware and the services. The study uses the pairwise comparison method for exploring the preferences of Hungarian higher education students in the field by gender, age, internet use frequency, and work experience. Based on 538 responses, the size of memory and the storage capacity are considered as important factors when selecting a smartphone, while the screen size is the least relevant for the total sample. Cluster analysis separated two groups, one with a clear brand-preference and another with a performance-centric approach to the selection.

Keywords: mobilization, smartphone, customer behavior, preferences, pairwise comparison
JEL Codes: D12, O33

Termékjellemzők értékelése: felsőoktatásban tanulók preferenciái okostelefon kiválasztásánál

A mobil eszközök elterjedése jelentős hatással van az információs társadalom kiteljesedésére. Az okostelefonok olyan alapvető eszközökké váltak, amelyekkel elérhetők a különböző szolgáltatások. Habár jelentős szabványosítás figyelhető meg a készülékek működésében, sokféle kivitel érhető el. Az okostelefonok jellemzőivel kapcsolatos felhasználói preferenciák vizsgálata mind az eszközök, mind a szolgáltatások fejlesztése szempontjából fontos. Tanulmányunkban páros összehasonlítás módszerével vizsgáljuk egyetemi hallgatók véleményét nem, életkor, internethasználati szokások és munkatapasztalat szerinti csoportosításban. 538 elemű minta alapján a memória és a tárhely mérete a legtöbb válaszadó által fontosan ítélt jellemzők, míg a kijelző mérete a legkevésbé fontos. Klaszter-analízissel segítségével két csoportot sikerült elkülöníteni, az egyik kifejezetten márka-központúan, a másik teljesítmény-központúan gondolkodik.

Kulcsszavak: mobilizáció, okostelefon, fogyasztói magatartás, preferenciák, páros összehasonlítás
JEL-kódok: D12, O33

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Introduction

Crosby defined quality as conformance to requirements (1979), and Juran found that it is the fitness for use (1951). Both approaches include the readiness of something in performing tasks and suggests the evaluation relative to the intended use. Customer satisfaction goes beyond the product or service quality. Organizational or market matters may influence it. Since it is a complex phenomenon, the evaluation of customer satisfaction requires a multidimensional approach, including technical, social, personal, and other issues. Garvin (1988) distinguished five parallel perspectives of quality:

- transcendent: focus on the competences an impression;
- product-based: focus on the product measurable characteristic of the product;
- manufacturing-based: focus on the accuracy of the manufacturing;
- value-based: focus on the product characteristic and the cost/price at the same time;
- user-based: focus on meeting customer needs and expectations.

Different characteristics can describe product and service quality (Garvin, 1988; Lehtinen–Lehtinen, 1991; Gibbs, 2010), including performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality. Considering quality management issues, some authors split product features into more nuanced categories. This paper uses the broader meaning of features, including:

- performance: operation characteristics of the product;
- features: whistles and bells of the product (Manu, 2011).

Our research is dealing with decision-making when it comes to preferences for choosing a smartphone. The purpose of the study is to explore how some essential characteristics of the devices are evaluated. The recent research activities in the field of information technology (IT) and info-communication technology (ICT) are diverse, and the focus is on cybersecurity and the software applications supporting smarter life. Meanwhile, the hardware and technical aspects of the technology are studied in a narrower professional field. In a quality-management approach, the performance and the features of the hardware have an indirect impact on customer satisfaction through the available software. However, we believe that suppressing the product characteristic may lead to wrong decisions.

Although there are some leading brands of smartphones on the market, and price-sensitivity must be considered, the question arises whether other factors play a role in device selection. Understanding user preferences offers a picture of the influencing factors of the perception of quality. The efforts can be used well for marketing purposes and supporting software development depending on user habits, but elaborating the responses require further research.

Selecting a smartphone can be considered as a decision-making problem. Quality management relies heavily on decision-making in its principles. Objective data collection and analysis is an obvious requirement. The ISO 9000:2015 emphasizes the concept of ‘evidence-based decision-making’. Faced with a high degree of uncertainty that decision-making can be involved in, the organization must turn to reliable sources of data and evidence, e.g., through key performance indicators, to be able to take action with full knowledge cause. Besides, these different elements must be analyzed objectively in order to avoid misinterpretations, which could lead to an unfortunate choice.

Mobilization in Hungary

Based on the data of the Hungarian Central Statistical Office, the diffusion of mobile phones has grown significantly in recent years. Nowadays, we can say the using them is general among individuals and businesses (*Figure 1*). The length of the total conversations has increased from

11,904 minutes in 2006 to 23,332 minutes in 2018 (KSH, 2020a). Internet use also has become essential. Moreover, mobile internet plays a significant role (*Figures 2* and *3*).

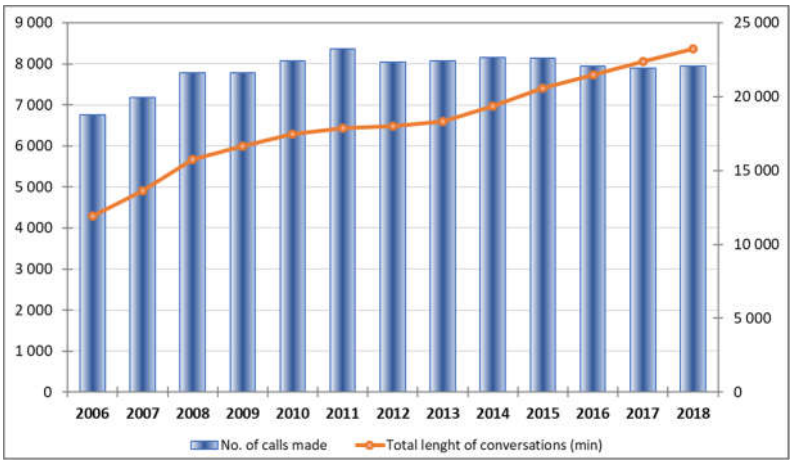

Figure 1: Conversations from a mobile network
Source: KSH (2020a)

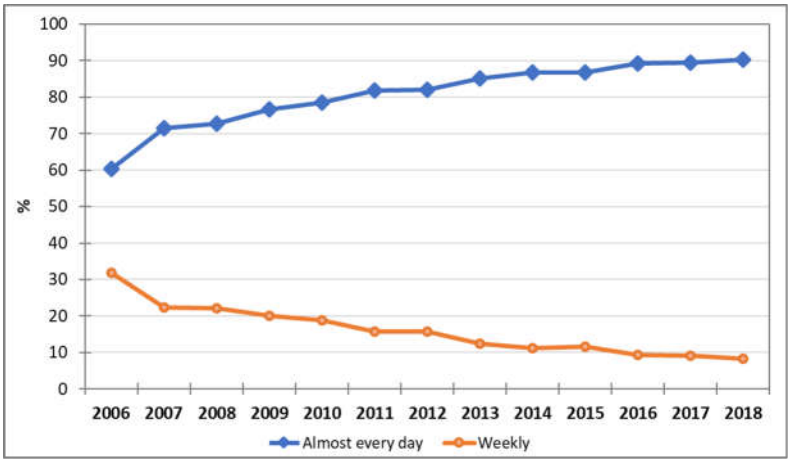

Figure 2: Frequency of internet use (% of the population)
Source: KSH (2020b)

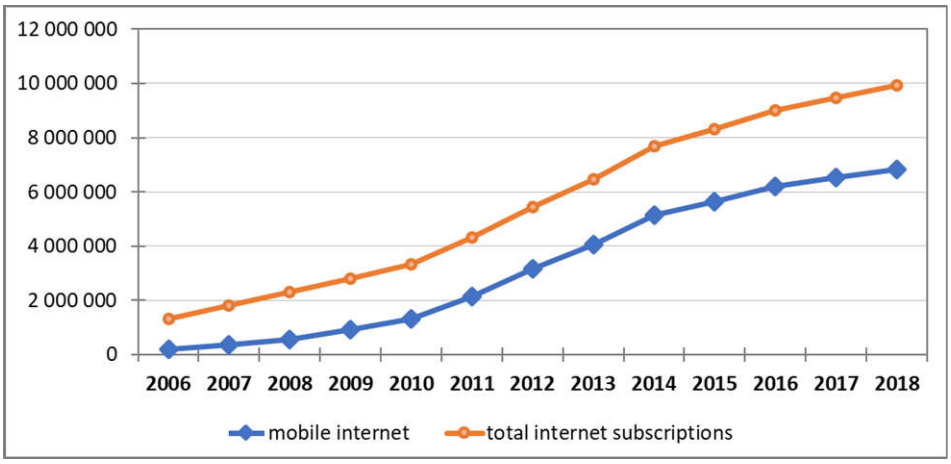

Figure 3: Internet/mobile internet subscriptions
Source: KSH (2020c; KSH, 2020d)

The remarkable increase in internet subscriptions and everyday smartphone use raises the possibility of many related studies. Sarwar and Soomro (2013) summarize the impacts of the spread of smartphones. The completion of the information society (Shrum et al., 2007) greatly depends on the availability of various services. Clouds can be considered as a key driver of development in the recent decade (see Armbrust et al., 2010; Wang et al., 2010; Bojanova et al., 2013). Nevertheless, access to the expanding services requires the hardware (smartphone, tablet, PC, or else) in order to enjoy the benefits. Product quality (Garvin, 1988) and service quality (Parasuraman et al., 1988) are uniquely intertwined in the layers of the mobile ecosystem (Fling, 2009).

Development of smartphone design

The most popular mobile operating systems and key smartphone vendors are concentrating on bringing features both in operating systems and devices, which will provide an exciting feature to enterprise and general consumers (Sarwar & Soomro, 2013). On the one hand, smartphone providers strive for uniqueness to convince customers. On the other hand, a relevant convergence is to observe, including the main features, services along with the technical content of the devices.

Fling (2009) five stages of the evolution of the devices:

- 'Brick' era (1973-1988): large size and bulky devices due to the available battery technology, but mobile telephony was launched.
- 'Candy bar' era (1988-1998): long, thin, rectangular form factor of the majority of mobile devices with 2G network access, advanced portability was allowed.
- 'Feature phone' era (1998-2008): less radical technological leap than before, but enhanced usability through photography, games, music, and others.
- 'Smartphone' era (2002-): extended functionality, the office moved to the phone
- 'Touch' era (2007-): the era was launched with the first iPhone and continued with a wide variety of new devices and services under a growing sized display.

Along with the development of design, the utilization of devices has been changed that is mirrored in studies about users' preferences (*Table 1*). Some factors used by Ling et al. (2007) are still valid today; the key features are realigned and expanded. E.g., storage capacity, connectivity, and camera options came into view.

Table 1: Evaluation factors of mobile phone features

Authors	Features under investigation	Main finding
Ling et al. (2014)	calling-related, personal preference, portability, organizing, keypad design, durability, aesthetics, and dialing	The most important design features are the physical appearance, size, and menu organization.
Roseli et al. (2016)	product features, brand, price, and social features	All variables have a positive relationship with the consumers' buying decisions.
Afroz (2017)	battery backup, camera resolution, durability, price, brand	Positive correlations among the variables and price have a significant impact on the overall preferences of the consumers. Brand preference is highlighted.
Rajasekar et al. (2018)	the operating system, storage capacity, display, network generation, battery life camera resolution, color and design, and processing speed	The order of importance is the quality of the product, brand image, product features. Family or friends' suggestions and promotions have a lower weight.
Kim et al. (2020)	brand, screen size, price, memory, and user recognition technology	The brand is the essential attribute of a smartphone, and Apple is the strongest in brand loyalty in South Korea.

Source: own edition

Nowadays, research interest is more moderate in device design that a few years ago, but usability investigations and brand loyalty are becoming more and more popular (Gowthami–Venkatakrishnakumar, 2016; Afroz, 2017; Rajasekaran et al., 2018). Unfortunately, health impacts of overuse and addiction to some services must also come to the forth (see, e.g., Anshari et al., 2016; Harshe et al., 2017; Ding et al., 2019; Pikó–Kiss, 2019; Matthes et al., 2020) as well as security challenges (see Kim, 2015; Zaidi et al., 2016; Ameen et al., 2020; Breitinger et al., 2020).

Understanding user preferences for smartphones is a continuous challenge in order to take advantage of the information society.

Goals and methods

The study aims to explore the preference orders among the performance factors and to look for patterns among the respondents. Sub-samples are specified by gender, age, level of studies, work experience, and frequency of using mobile internet. Beyond these factors, a statistical cluster analysis was applied based on individual rankings.

The main objective of this study is to understand the importance of evidence-based decision-making in keeping a student's loyalty towards the smartphone. The other objectives of the study are as follows

- to analyze various factors affecting the choices a student makes when choosing a smartphone;
- to assess the student's preference consistency;
- to know the student's perception towards their smartphone's battery, storage capacity, display, and brand.

The scope of the data collection is limited to higher education students in the current phase of the research. This paper shows the results of our pilot research based on the responses of the business students of the University of Miskolc.

The research uses an online survey managed by the EvaSys Survey Automation Software of the University of Miskolc. The data collection period covers the years 2018 and 2019. Statistical analysis is supported by IBM SPSS. A comprehensive summary of the results is to find in the Appendix (*Tables 5-7*).

According to mobile phones, Hlédik (2015) confirms the difficulties of measuring preferences in the case of products with widespread and diverse features. This study uses a simplified approach for overall evaluation and to avoid focusing on one device by the respondents. According to the eight quality dimensions, performance, and features describe the main characteristics of a product and its services. In practice, these are usually difficult to separate unless knowing the specified products. There are five factors (survey items) defined for the research, including battery life, (large) size of the display, memory size (RAM), internal storage capacity, and brand. Data collection is prepared for pairwise comparison that allows setting the order of importance of the selected factors. For these five factors, the evaluation formulates ten statements (Kindler–Papp, 1977) that asked the respondents to select which of the two listed items is more important. Beyond the purposes of using a smartphone, the statistical analysis includes:

- individual and group level rankings by various grouping factors;
- indicator of the personal level of consistency;
- group-level consensus indicators by the coefficient of concordance;
- correlation analysis and cross-tabulation;
- relative weights between the factors by the Guilford method (Kindler–Papp, 1977) and the weights by the eigenvector method (Saaty, 1980) for respondents with a clear preference order. The results of the eigenvector method give the weights on the ratio-scale.

The personal level of consistency (K) is measured between 0 and 1. The 0 value is the complete absence of consistency, 1 shows the complete consistency, i.e., the respondent has a clear list of preferences. The group-level consensus is based on Kendall's coefficient of concordance for pairwise comparison (ν) (analysis is limited to cases where K=1). Since the maximum value of ν is 1, but the minimum is not fixed, it depends on the number of cases (m): $\nu_{even} = -1/(m-1)$ and $\nu_{odd} = -1/m$ (Kindler–Papp, 1977). In order to ensure the comparison, we calculated a corrected coefficient of consensus by interpolation, and it is expressed in percentages.

Results

Sample characteristics

The research sample consists of 538 responses as follows:

- gender: 66.7% females and 33.3% males,
- age: 81.8% between 18-24 years, 12.1% between 25-34 years, 6.1% 35 years old or older,
- level of studies: 27.7% higher vocational training, 67.1% bachelor level, 5.2% master level students,
- work experience: 47.6% of the respondents have some work experience.

Mobile internet use was asked to be evaluated by the frequency. 5.6% of the respondents do not use mobile internet at all, 7.8% are occasional users, while 38.8% marked frequent use and 47.8% continuous use of mobile internet.

There are 386 respondents (71.75%) who have a clear preference order. The minimum value is typical of master students (67.86%), and the maximum value is typical of occasional mobile internet users (83.33%).

The most common purposes of using a smartphone are chat activities, visiting social sites, and listening to music. At the same time, watching movies and working are at the bottom of the list; the respondents perform these activities not with their smartphones (*Figure 4*).

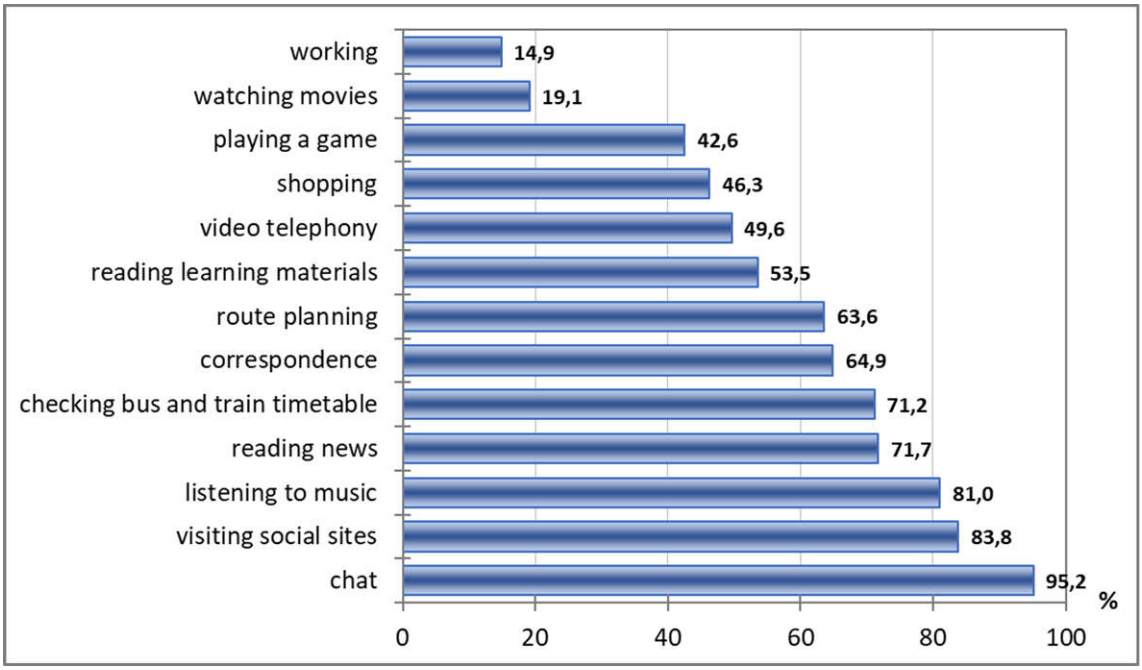

Figure 4: Activities performed by a smartphone among the respondents
Source: own research

According to the results of the pairwise comparison, the number of clear preference orders is 386 (71.74%). The average level of concordance (ν_{corr}) is 17.09%.

Preference orders

According to the total sample, memory (RAM) and storage capacity are the featured factors when selecting a smartphone, while the large display is the least important. Based on the rankings, memory is preferred to any other factors in 66.13% of the cases and display size only in 20.40% of the cases (*Figure 5*). The brand is one of the less important factors among the items, but 47.3% of the respondents marked it as important. Notwithstanding, the group level consensus of the opinions is only 17.10%. The weight by the eigenvector model (*Figure 6*) shades the differences, primarily the importance of battery life and the importance of the brand.

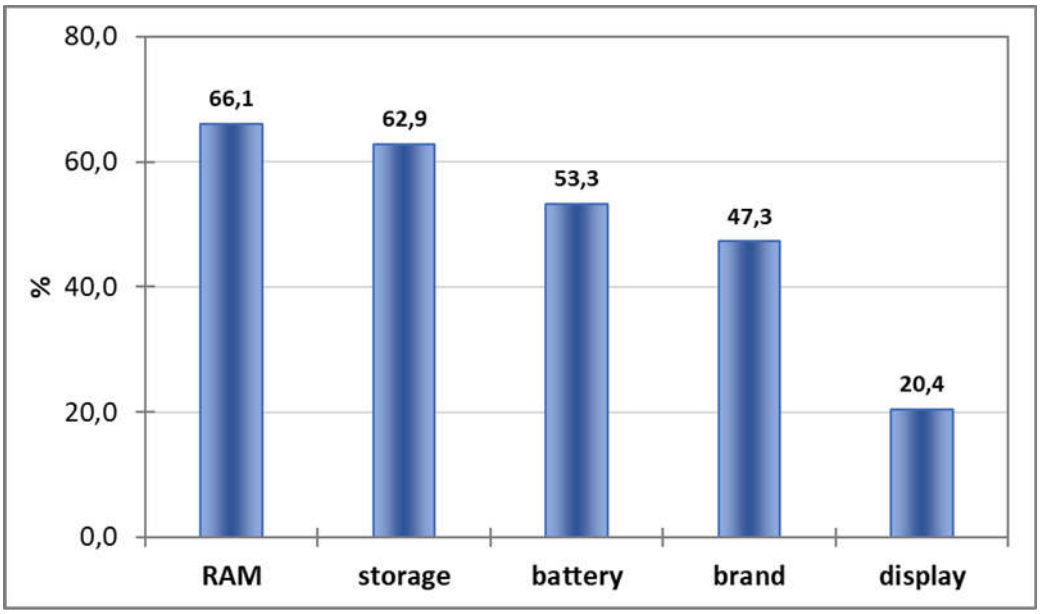

Figure 5: Preference orders by the rank sum (total sample)
Source: own research

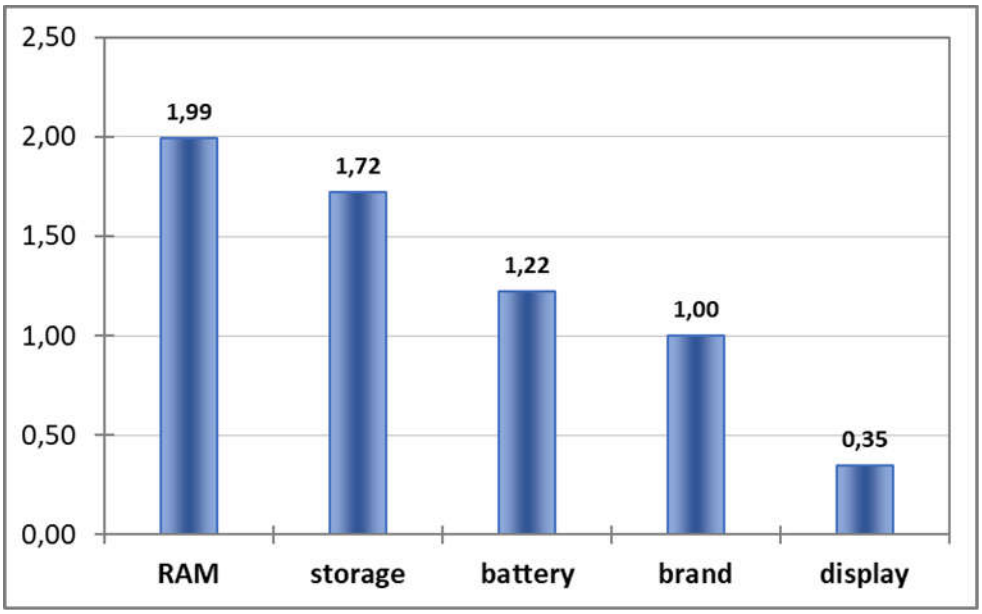

Figure 6: Preference weights (eigenvector method, compared to the brand)
Source: own research

The results by sub-samples show only a few remarkable differences (based on the rankings summarized in the *Appendix*):

- according to the age, the older respondents prefer the large display, and the brand of the smartphone is essential for a minority of them,
- storage capacity is more important for females than males,
- large display size is more important for students with work experience than without,
- the more use of mobile internet comes with lower importance of battery capacity and memory size, but the appreciation of the brand of the smartphone (*Figure 7*).

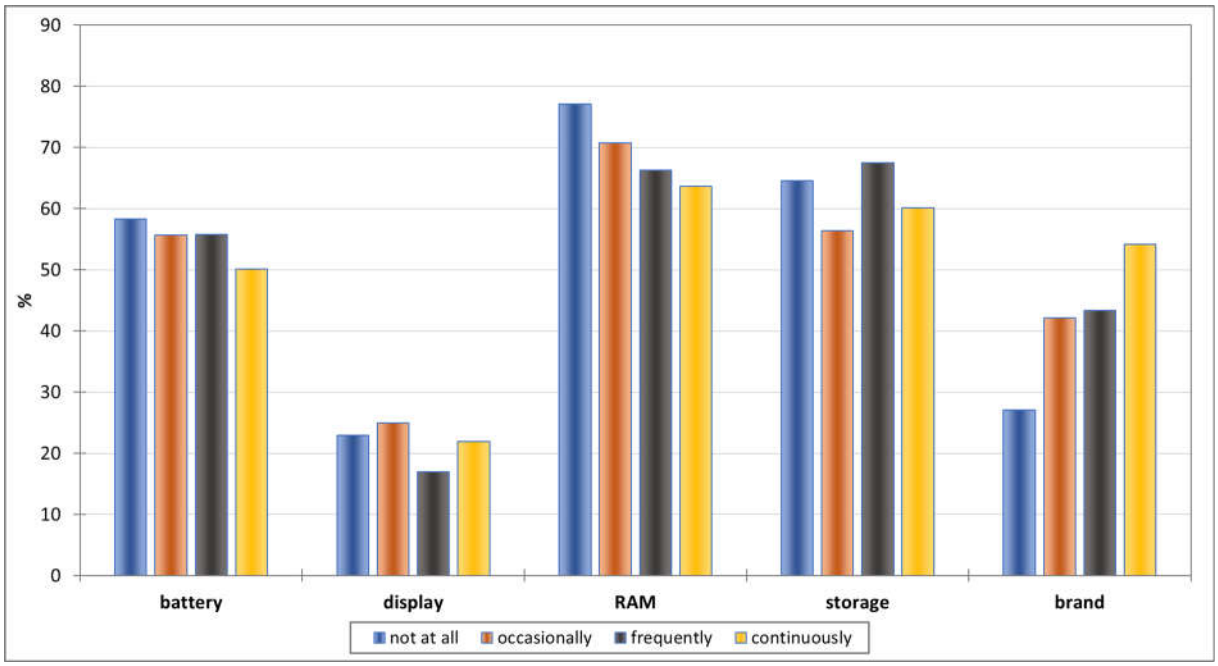

Figure 7: Preference orders by internet use frequency (% of the available rank-sum)
Source: own research

Vision loss in older age may explain the need for a large display, but the data sample may not be affected by this problem. Along with the results that large display is preferred among students with work experience, the software required for their job may be in the background.

The decreasing rank-sums of battery and RAM with the increasing internet use is a surprising result. We assume that these respondents use high-performance smartphones in these features: below a certain level, they do not even consider a device.

Cross-tabulation between the grouping factors and the preference order confirmed some relations (*Table 2*).

Table 2: Significant results of cross-tabulation

Factors		Pearson χ^2	d_f	sig.	note
battery	gender	11.204	4	.024	more important for males
display	age category	28.336	8	.000	less important for 18-24 years old respondents
storage	gender	35.561	4	.000	more important for females
brand	gender	12.832	4	.012	more important for females
brand	mobile internet use	21.163	12	.048	more important for more frequent users

Source: own research

Cluster analysis

The different methods for weight calculation did not allow us to draw up distinct profiles of the preferences. We used the individual rank sums for separating the groups of preferences. Two-step clustering offers 2 clusters with a fair quality (the average silhouette of cohesion and separation is 0.4). Hierarchical clustering confirms the existence of two clusters. The between-group (average) linkage method gave the best results by both the dendrogram and the cross-tabulation analysis. *Figure 8* shows that performance-centric and brand-centric clusters have remarkably different opinions. 67.4% of the respondents have a clear preference order among brand-centric and 74.5% among performance-centric respondents. The distribution of the rank sums by the clusters are presented in *Table 3*.

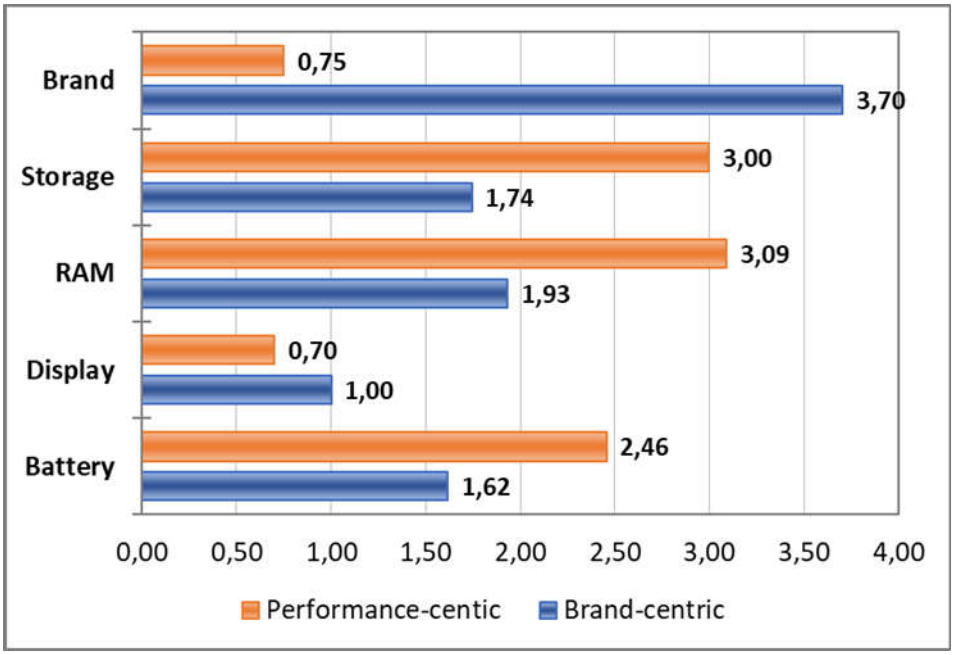

Figure 8: Preference orders by clusters (weighted average value of the rankings)
Source: own research

Table 3: Rank sum by clusters (% of respondents)

Rank sum	Battery		Display		RAM		Storage		Brand	
	Brand	Perf.	Brand	Perf.	Brand	Perf.	Brand	Perf.	Brand	Perf.
0	28.2	5.9	47.7	52.7	12.8	0.0	11.4	0.8	0.0	40.5
1	26.2	13.9	20.8	30.4	22.1	5.9	30.9	5.1	0.0	44.7
2	13.4	37.6	16.8	11.8	33.6	15.6	32.2	21.1	4.0	13.9
3	20.1	13.9	13.4	4.2	22.1	41.8	22.8	39.2	21.5	0.8
4	12.1	28.7	1.3	0.8	9.4	36.7	2.7	33.8	74.5	0.0

Source: own research

Based on the weights calculated with the eigenvector method, the brand is more than ten times as important as any other factor among brand-centric respondents. At the same time, the results performance-centric respondents still show the opposite. The level of concordance is remarkably higher in both clusters than in the total sample ($v_{corr,brand}$=33.84%, $v_{corr,performance}$=45.81%). The cross-tabulation between cluster membership and mobile internet use (*Figure 9*) shows a significant difference (χ^2= 9.739, d_f=3, sig.=.021).

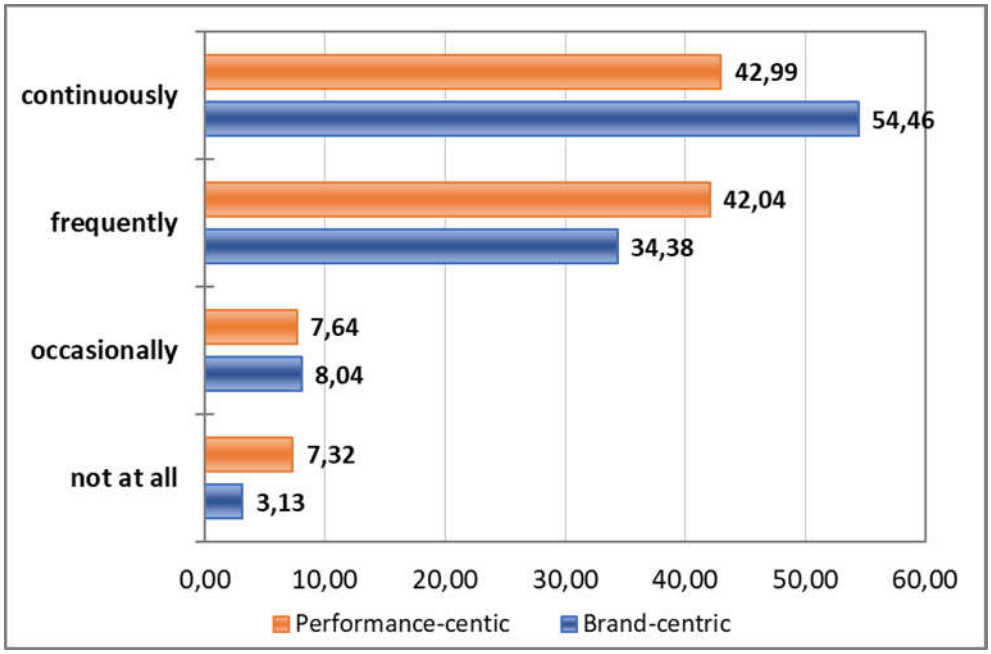

Figure 9: Internet use by clusters (% of the respondents)
Source: own research

Purpose of the smartphone use

The relation between various grouping factors and the purpose of the smartphone use is tested by cross-tabulation. However, there are no significant differences by cluster membership, age, gender, and mobile internet use. The results are summarized in *Table 4*.

Table 4. Significant results of cross-tabulation by grouping factors

Factors		Pearson χ^2	d_f	sig.	note
age category	chat	26.876	2	.000	all relations show that these activities are more typical of younger respondents
	watching movies	7.518	2	.023	
	playing game	15.324	2	.000	
	visiting social sites	11.685	2	.023	
	reading learning materials	10.693	2	.005	
	shopping	13.293	2	.001	
	video telephony	26.155	2	.000	
	listening to music	36.676	2	.000	
gender	chat	7.984	2	.000	the high frequency in both groups, f_{female}=97.7%, f_{male}=91.4%
	reading learning materials	6.364	1	.012	f_{female} =57.4%, f_{male} =43.8%
	shopping	4.746	1	.029	f_{female} =57.4%, f_{male} =43.8%
	listening to music	4.629	1	.031	f_{female} =51.6%, f_{male} =42.2%
level of studies	chat	35.065	2	.000	$f_{hihgvoc}$=97.2%, $f_{bachelor}$=96.9%, f_{master}=68.4%
	watching movies	6.237	2	.044	$f_{hihgvoc}$=24.3%, $f_{bachelor}$=15.4%, f_{master}=5.3%
	visiting social sites	22.224	2	.000	$f_{hihgvoc}$ =89.7%, $f_{bachelor}$=85%, f_{master}=47.4%
	reading learning materials	6.117	2	.047	$f_{hihgvoc}$=57.0%, $f_{bachelor}$=53.0%, f_{master} =26.3%
	shopping	8.286	2	.016	$f_{hihgvoc}$ =54.2%, $f_{bachelor}$=43.5%, f_{master}=21.1%
	listening to music	10.789	2	.005	$f_{hihgvoc}$ =84.1%, $f_{bachelor}$=81.9%, f_{master}=52.6%
work experience	correspondence	16.078	1	.000	$f_{without}$=53.3%, f_{work}=73.0%
	shopping	11.133	1	.001	$f_{without}$=37.1%, f_{work} =54.0%

mobile internet use	chat	54.421	3	.000	more frequent mobile internet use comes with higher frequencies in case
	visiting social sites	14.475	3	.002	
	correspondence	13.478	3	.004	
	route planning	16.753	3	.001	
	shopping	29.196	3	.000	
	video telephony	25.503	3	.000	
	listening to music	8.261	3	.041	

Source: SPSS output

Conclusion

The diffusion of smartphones was remarkable is the recent decade. The technological development allowed us to relocate several functions and the support of the daily activities to this handheld device. However, both the hardware and the software are continuously developed, and new designs are under development. Folding phones are the focus of attention since the reasonable increase of the display as one unit is no longer possible. According to the authors, the supply of smart (mobile) phones became less varied in recent years; i.e., the devices look very similar as well as the technologies and services are more unified than before. At the same time, several brands and product variations are available.

The research aimed to explore user preferences about the technological features of smartphones among higher education students. The results show a detailed picture of the preferences by age, gender, level of studies, work experience, and the frequency of mobile internet use, but the range of significant results is sporadic. Cluster analysis separated brand-centric and performance-centric groups that confirm the relevance of brand loyalty. The clusters show a much higher group level consensus than the average. Eventually, the cluster membership does not show significant relations with the grouping factors of the research. The weights calculated for the items of the survey confirm the results of the cluster analysis.

In parallel, we checked the relation between the scope of smartphone use and the grouping factors. Developing clusters for these have failed, but cross-tabulation shows significant differences in the smartphone use patterns. Younger people are more active that is also reflected in the case of the level of studies (they are overrepresented in the sample).

The few occurrences of significant differences by the selected grouping factors about the features of smartphones can carry the meaning that everyone is equally well-informed and interested in the technical issues. However, we feel that this conclusion can be preferably formulated as the respondents are equally not interested in the hardware side of the smartphone. Some of them follow and check the technical features, while others make a decision based on the brand. As a result, quality as the satisfaction of the customer cannot be treated uniformly among smartphone users. However, the well-separated patterns allow developing targeted strategies both for product design and promotion.

The next step of our research is to explore the details of the critical features and to expand the data collection to other user groups.

Limitations

The representativeness of the sample was not checked, and the data collection scope is limited to a county, which is Hungary (Miskolc). However, presentation is limited due to the sample selection and the method of questioning; the findings can contribute a better understanding of the field. The online survey was entirely voluntary without supervision while completing it, the results may reflect the reality with a bias, even though the sample size and non-parametric methods of the analysis make the results less sensitive.

The results might not be used as a full and might not be considered applicable in all cases where electronics are involved. The specificity of the sample taken will not be useful when it comes to working individuals or non-student respondents. The outcome of the research might not be precise enough to be utilized for new smartphone users as the case study was students that have been phone users for a while.

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Appendix

Table 5: Abbreviations in the Appendix

Age1	**respondents between 18-24 years old**
Age2	respondents between 25-34 years old
Age3	respondents at the age of 35 or older
Gender1	Female respondents
Gender2	male respondents
Work1	Respondents without any work experience
Work2	Respondents with work experience (employment or internship)
Studies1	Higher vocational
Studies2	Bachelor (BA/BSc) studies
Studies3	Master (MA/MSc) studies
Net1	Respondent who do not use mobile internet
Net2	Respondents who use mobile interne occasionally
Net3	Frequent mobile internet users
Net4	Continuous mobile internet users
Cluster1	Members of the brand-centric cluster
Cluster2	Members of the performance-centric cluster
n, n (K=1)	number of respondents in the sample, number of respondents in the sample with a clear preference order (K=1)
K=1 (%)	Proportion of respondents with a clear preference order in the sample
v, v_{min}, v_{corr}	Kendall's coefficient of concordance for pairwise comparison, minimum vale, corrected value
a, a%	Rank-sum of the item, rank-sum / available rank-sum
Z	Z-score by the Guilford method, interval sclale between 0% and 100%
S	Weight calculated by the eigenvector method

Source: own edition

Table 6: Sample size, clear preference orders and level of concordance

	Age1	**Age2**	**Age3**	**Gender1**	**Gender2**	**Work1**	**Work2**	**Cluster 1**
n	440	65	33	359	179	282	256	151
n (K=1)	316	46	24	258	128	197	189	151
K=1 (%)	71.818	70.769	72.727	71.866	71.508	69.858	73.828	100.000
V	0.194	0.089	0.074	0.209	0.123	0.206	0.131	0.334
V_{min}	-0.003	-0.022	-0.043	-0.004	-0.008	-0.005	-0.005	-0.007
V_{corr}	19.700	10.907	11.250	21.174	12.974	20.954	13.574	33.835
	Studies1	**Studies2**	**Studies3**	**Net1**	**Net2**	**Net3**	**Net4**	**Cluster 2**
n	149	361	28	30	42	209	257	235
n (K=1)	107	260	19	24	35	147	180	235
K=1 (%)	71.812	72.022	67.857	80.000	83.333	70.335	70.039	100.000
V	0.191	0.161	0.153	0.268	0.134	0.222	0.137	0.456
V_{min}	-0.009	-0.004	-0.053	-0.043	-0.029	-0.007	-0.006	-0.004
V_{corr}	19.853	16.398	19.556	29.861	15.817	22.747	14.142	45.809

Source: own research

Table 7: Weight calculated with different methods

	Total sample				Gender1				Gender2			
	a	a%	Z	S	a	a%	Z	S	a	a%	Z	S
battery	823	53.30	72.69	1.22	531	51.45	66.57	1.23	292	57.03	78.41	1.20
display	315	20.40	0.00	0.35	192	18.60	0.00	0.33	123	24.02	0.00	0.37
RAM	1021	66.13	100.00	1.99	682	66.09	94.74	2.17	339	66.21	100.00	1.71
storage	971	62.89	92.95	1.72	709	68.70	100.00	2.32	262	51.17	64.98	0.99
brand	730	47.28	60.13	1.00	466	45.16	54.67	1.00	264	51.56	65.87	1.00
	Age1				Age2				Age3			
	a	a%	Z	S	a	a%	Z	S	a	a%	Z	S
battery	672	53.16	72.95	1.19	100	54.35	73.52	1.09	51	53.13	64.77	2.15
display	227	17.96	0.00	0.30	48	26.09	0.00	0.40	40	41.67	33.04	1.47
RAM	845	66.85	100.00	2.02	119	64.67	100.00	1.62	57	59.38	82.17	2.69
storage	810	64.08	94.38	1.79	98	53.26	70.78	1.05	63	65.63	100.00	3.30
brand	606	47.94	62.87	1.00	95	51.63	66.68	1.00	29	30.21	0.00	1.00
	Studies1				Studies2				Studies3			
	a	a%	Z	S	a	a%	Z	S	a	a%	Z	S
battery	243	56.78	76.23	1.64	531	51.06	68.30	1.06	49	64.47	100.00	1.81
display	83	19.39	0.00	0.39	219	21.06	0.00	0.34	13	17.11	0.00	0.28
RAM	294	68.69	100.00	2.52	682	65.58	100.00	1.85	45	59.21	89.25	1.55
storage	267	62.38	87.23	2.03	658	63.27	94.83	1.63	46	60.53	91.91	1.52
brand	183	42.76	49.18	1.00	510	49.04	63.97	1.00	37	48.68	68.26	1.00
	Cluster 1				Cluster 2				Work1			
	a	a%	Z	S	a	a%	Z	S	a	a%	Z	S
battery	243	40.23	21.99	0.08	580	61.70	73.00	9.11	425	53.93	73.39	1.23
display	149	24.67	0.00	0.04	166	17.66	0.00	1.12	133	16.88	0.00	0.28
RAM	292	48.34	32.76	0.10	729	77.55	100.00	22.21	536	68.02	100.00	2.18
storage	268	44.37	27.51	0.08	703	74.79	94.98	17.98	499	63.32	90.92	1.74
brand	558	92.38	100.00	1.00	172	18.30	1.27	1.00	377	47.84	62.19	1.00
	Work2				Net1				Net2			
	a	a%	Z	S	a	a%	Z	S	a	a%	Z	S
battery	398	52.65	71.85	1.22	56	58.33	64.65	3.27	78	55.71	67.11	1.55
display	182	24.07	0.00	0.43	22	22.92	0.00	0.75	35	25.00	0.00	0.50
RAM	485	64.15	100.00	1.85	74	77.08	100.00	7.67	99	70.71	100.00	2.78
storage	472	62.43	95.71	1.71	62	64.58	75.89	4.66	79	56.43	68.63	1.61
brand	353	46.69	57.52	1.00	26	27.08	8.37	1.00	59	42.14	38.44	1.00
	Net3				Net4							
	a	a%	Z	S	a	a%	Z	S				
battery	328	55.78	77.49	1.53	361	50.14	68.64	0.87				
display	100	17.01	0.00	0.32	158	21.94	0.00	0.30				
RAM	390	66.33	97.65	2.50	458	63.61	100.00	1.39				
storage	397	67.52	100.00	2.34	433	60.14	91.78	1.22				
brand	255	43.37	54.33	1.00	390	54.17	77.91	1.00				

Source: own research