



DOMINANT GROUPS AND DIFFERENCES IN SMART PHONE AND INTERNET USAGE: A DISCRIMINANT ANALYSIS APPROACH

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ABSTRACT

The present study was primarily aimed to explore the dominant groups of smart phone and internet usage factors of college students and also to identify the mean differences in their demographic profiles with respect smart phone and internet usage. The discriminant analysis approach has been adopted to differentiate different dominant cluster groups of college students based on their perception towards smart phone and internet usage. Further, mean differences with respect to demographic profiles such as, gender, family type, monthly family income and data source for internet usage with respect to smart phone and internet usage has been explored. The empirical evidences significantly classified the respondents into three dominant groups and significance of difference in mean values was also explored in this study.

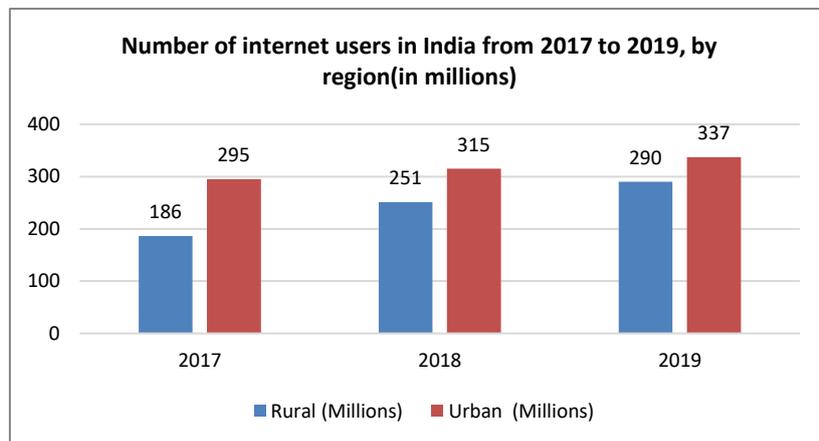
Keywords: Smart Phone, Internet, College Students, Usage Groups and Discriminant Analysis

Cite this Article: M. Suresh, P. Balaji and P. M. Rameshkumar, Dominant Groups and Differences in Smart Phone and Internet Usage: A Discriminant Analysis Approach, *International Journal of Management*, 11 (4), 2020, pp. 305-315.

<http://www.iaeme.com/IJM/issues.asp?JType=IJM&VType=11&IType=4>

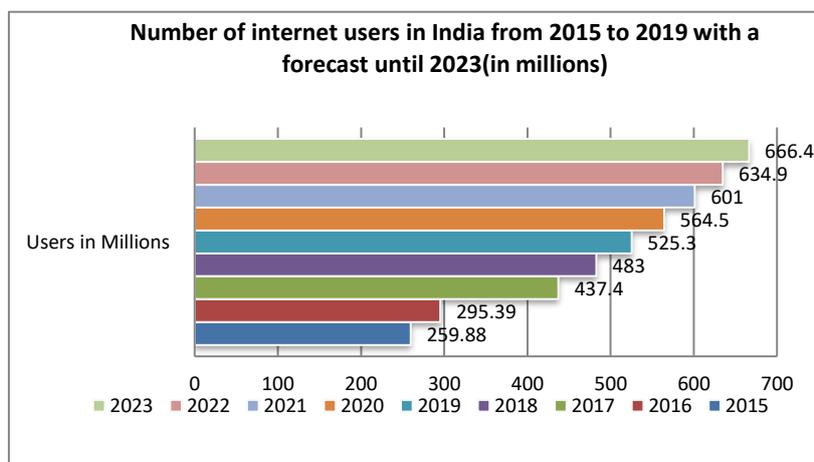
1. INTRODUCTION

Today’s generation students are having higher exposure to the usage of different electronic devices such as, smart phones, tablets, computers and many other electronic gadgets due to the technological growth in 21st century (Astrachan, 2011; Gul & Bano, 2019; Barbu, 2015). Especially, smart phone with internet connectivity brings the entire world in their hand (Kumar & Vasanth, 2017; Young, 1998; Young, 1996). Young adults have higher usage tendency of smart phone for social media networking sites (SNS) and games addiction in their daily life (Jeonget.al, 2016; Balajiet.al, 2018; Koet.al, 2012).Over the decades, internet usage, smart phone usage, television involvement, video games addiction and different mobile applications are key reasons for different types of disorders and negative consequences (Choi, 2019; Debasis Das & Lanjewar, 2020). Internet usage was rapidly increased over the past decades (Evans, 2019). For example, Spain witnessed, teenagers are higher users of smartphones over computers in 2015 (Roldán, 2016).India has more than 560 million internet users and India is the second largest country to have higher internet users in the country. Statistica Research Department predicted that in the year 2021, India will have more than 600 million internet users. In 2017, only 34% of the Indian population have access to internet and recently it was increased to 44%. Further, 70% of the users are males and remaining 30% of the users are females.



(Source: Statistica Research Department Report, 2020)

Graph 1 Region Wise Internet Users in India region (in millions)



(Source: Statistica Research Department Report, 2020)

Graph 2 Internet Users forecast Until2023 (in millions)

Graph 1 reveals that regions have significance difference in internet usage and urban people have higher internet usage as compared to rural people in India in last three years. Graph 2 shows that internet user base in India is showing increasing trend every year from 2015 to 2019. Further, Statistica Research Department predicted that 2023, India will have 666.4 millions of internet users in the Country.

The societal engagement and peer interpersonal communication are the major key drivers for the growth of smart phone and internet usage among youth (Khang et al., 2013) and it facilitates to stay connected with their social groups (Kim et al. 2015). Smart phones are became part and parcel of every individual in modern day life style (Oulasvirta et al., 2012). Today, peoples face many problems to overcome the usage of smart phone (Merlo et al., 2013). Majority of the school students and under-graduate students are smart phone users with internet accessibility (Smith *et.al*, 2009; Suki & Suki, 2013; Sasikumar & Balaji, 2020). On the other hand, social media is a phenomenon witnessed rapid growth across the globe which in turns has higher usage to smart phone and internet usage in the day-to-day lives. (Shantharamet.al., 2019). Smart phone, internet and SNS help to communicate the vast number of real time information within a limited time (Balaji & Murthy, 2019). However, there are many psychological and psychological problems and addictions are highly witnessed among youth (Agostino and Sidorova, 2017; Chun, 2016). There is a need to understand the discriminating factors and differences among youth especially, college students to overcome the smart phone and internet addiction.

2. LITERATURE REVIEW

NoaAharony (2017) carried an exploratory study to examine the influence of personal characteristics of the Israeli students' mobile phone usage. The researcher has adopted a survey method to collect the information about mobile phone usage and structured questionnaire was used for the same. The purposive sampling method was adopted to select 181 library information science students to participate in the present exploratory study. The result proves that personality characteristics of the students are key motivators for the usage of mobile phones and social network system is the major aspect for the usage of mobile phone among Israeli students.

Al-Mouh & Al-Khalifa (2015) studies the accessibility and usage of smart phone among visually impaired people in Saudi Arabia. This study was primarily aimed to investigate the different usage purpose of smart phone among visually impaired peoples day-to-day life. The research study proves that many problems have been faced by visually impaired peoples to use the smart phone. Hence, the researcher suggested the developers to improve the different accessibility purposes for visually impaired peoples to use smart phone.

ImtiazArifet.al, (2015) carried an exploratory study to examine the dependency level of the students towards their smart phone and its impact on their purchasing behaviour in Pakistan. The researchers have conducted a hypothetical investigation to understand the students' perception towards smart phone dependence and its impact on their behaviour. The sample of 337 has been collected by the researchers through adoption of non-probability purposive sampling technique. The empirical evidences prove that Pakistani students have higher dependence towards their smart phone and effects of smart phone dependence have impact in their purchasing behaviour.

Archana and Balaji (2019) conducted an empirical study to examine the prevalence and psychological intervention of internet and smart phone addiction among college youth in Chennai city of Tamil Nadu. The researchers adopted descriptive and empirical research design and structured questionnaire was employed to gather 173 samples on the perception of students towards their smart phone and internet addiction. The result indicates that cognitive

confinement, Laxness ad usage supremacy are the major key factors of internet and smart phone addition. Further, suggested to focus the activities of physical and mental involvement rather than the virtual involvement in the internet and smart phone.

Georgina MakuCobla and Eric Osei-Assibey (2018) carried a case study among Ghana students on their tendency towards mobile money adoption and spending behaviour. This study was primarily aimed to investigate the mobile money adoption and spending behaviour of students. The researchers administered a structured questionnaire to gather primary information from 550 students through random sampling method. The result proves that mobile money services have significant influence on their spending behaviour and those who have mobile money usage are spending more as compared to students those who do not have mobile money adoption.

IshaGhosh and Vivek Singh (2018) made an attempt to study the attitudinal behaviour of mobile phone users with respect to privacy and security aspects of usage. This study was adopted a mixed method approach to collect primary information about privacy concerns of the mobile phone usage. The result shows that metadata of mobile phone act as a vital factor to provide clues about individual privacy attitude. Further, the researchers suggested the users to understand effectively on different features of mobile phones towards predictive power.

3. PROBLEM STATEMENT

The different outcomes of smart phone and internet usage are negative due to psychological and behavioural dependence among the users. There are many physical and mental problems are arising due to excessive usage of smart phone and internet (Archana and Balaji, 2019; Manickam & Heggde 2019; Nguyen *et.al*, 2017). The time spent by every users are drastically increasing day-by-day. There is a imperative need to explore the dominant groups and differences in the smart phone and internet usage to devise appropriate strategies to overcome negative causes of smart phone and internet usage among young adults (Pattanaik, 2019; Haverila, 2011).

4. AIMS OF THE STUDY

- To identify dominant cluster groups of Smart Phone and Internet Usage (SIU) factors of college students.
- To find out the mean different between selected demographic profiles with respect to Smart Phone and Internet Usage (SIU) factors among college students.

5. RESEARCH METHODS

The present study adopted mixed-method approach and judgement sampling method to collect responses from college students through, questionnaire method, interview schedule method and online survey (Less than 25 % of the overall sample) from residents of Chennai city of Tamil Nadu. The students perusing under-graduation and post-graduation from different arts and science colleges of Chennai were alone participated in the survey. At the outset, 325 samples were collected from the population and only 275 samples were finalised after the elimination of extreme values and samples not suitable for the empirical study.

6. QUESTIONNAIRE DESIGN AND PRE-TESTING

The structured questionnaire with three sections were finalized to gather the responses from college students such as, demographic profiles, eighteen smart phone and internet usage variables, measured in appropriate measurement scales. The Cronbach's Alpha co-efficient value of 0.750 indicates that, scale is more consistent and reliable in nature.

7. RESULTS AND DISCUSSION

The data collected were subjected to analysis of data with the help of SPSS Version 23.0 and the statistical tools such as, percentage analysis, descriptive analysis, cluster and discriminant analysis, independent samples t test and One-Way Analysis of Variance has been applied to draw meaningful solutions to the research problem. The college youth residing in Chennai city, using smart phone with internet accessibility has been selected to participate in the present empirical study and result indicates that majority of the respondents are males (60.40%), hailing from nuclear families (75.60%), singles (100.0%), using data card as a source for internet (78.20%) and opined that it's difficult to survive without smart phone (59.30%) in their regular life. Maximum number of the respondents' monthly family income was less than Rs. 20, 000 (48.00%). Further, exploratory factor analysis has been applied to reduce the eighteen smart phone and internet usage variables into meaningful and manageable factors. The result indicates that KMO and Bartlett's Test: Kaiser-Meyer-Olkin Measure of Sampling Adequacy. = 0.917, Bartlett's Test of Sphericity Approx. Chi-Square: 1690.025; df: 153; P-Value = <0.000. Three factors have been extracted out of eighteen variables and they explain 51.652% of the variance in the internet and smart phone usage variables. Thus, all the internet and smart phone usage variables have been reduced to three independent factors and the most dominant factor is Psychological Reliance Factor (PSRF) followed by Physiological Reliance Factor (PHRF) and Societal Apathy Factor (SAF) in their order of dominance.

Table 1: Descriptive Statistics for Smart Phone and Internet Usage Factors

Factors	Range	Minimum	Maximum	Mean (Std. Error)	Std. Deviation	Variance	Skewness Std. Error = (0.147)	Kurtosis Std. Error = (0.290)
PSRF	40.000	10.000	50.000	25.549 (0.535)	8.866	78.613	0.679	0.277
PHRF	16.000	4.000	20.000	12.524 (0.225)	3.737	13.966	-0.044	-0.450
SAF	16.000	4.000	20.000	11.204 (0.252)	4.174	17.418	0.255	-0.606

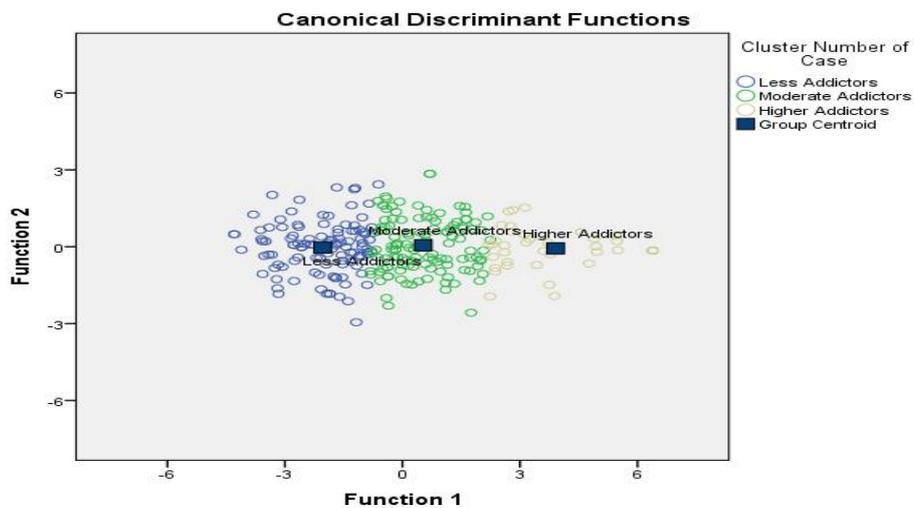
Table 1 indicates that Smart Phone and Internet Usage factors namely, PSRF, and SAF have slight positive skewness whereas, PHRF have slight negative skewness. Kurtosis for Smart Phone and Internet Usage factors are less than 3 (< 3) proves that data have normal distribution in it. The mean values of PSRF, PHRF and SAF are higher than the standard deviation proves there is robustness in the distribution.

7.1. Dominant Groups of Smart Phone and Internet Usage (SIU)

An attempt has been made to group all the respondents into distinctive dominant clusters (Priyaet.al, 2019) significantly differentiated by three smart phone and internet usage factors such as, Psychological Reliance Factor (PSRF) followed by Physiological Reliance Factor (PHRF) and Societal Apathy Factor (SAF) subject to application of K means cluster analysis and discriminant analysis and result are tabulated and presented in Table 2.

Table 2: Cluster Groups of the Respondents based on the Smart Phone and Internet Usage Factors

Factors	Discriminant Coefficient	Discriminant Loadings	Less Addiction Group	Moderate Addiction Group	Higher Addiction Group	Tests of Equality of Group Means		
			Mean (SD)	Mean (SD)	Mean (SD)	Wilks' Lambda	F-Value (df = 272)	P-Value
Psychological Reliance Factor (PSRF)	0.901	0.954	17.687 (3.678)	27.562 (3.732)	40.714 (5.619)	0.207	519.590	0.000
Physiological Reliance Factor (PHRF)	-0.687	0.700	10.553 (3.450)	12.958 (2.978)	16.523 (2.751)	0.705	56.965	0.000
Societal Apathy Factor (SAF)	0.855	0.548	8.428 (3.074)	12.024 (3.256)	16.238 (3.281)	0.579	98.833	0.000
Discriminant Function 1 : (WilksLambda = 0.192; Chi-square = 447.203, df = 6, Sig. = 0.000); Eigen Value = 4.196; Canonical Correlation = 0.899; P-Value = 0.000 @ 5% level of Significant.								
Discriminant Function 2 : (WilksLambda = 0.998; Chi-square = 0.642, df = 2, Sig. = 0.726); Eigen Value = 0.002; Canonical Correlation = 0.049; P-Value = 0.726 @ Not Significant @5% level.								
Accuracy of Respondents Classification								
		Cluster Number of Case	Predicted Group Membership			Total		
			Less Addiction Group	Moderate Addiction Group	Higher Addiction Group			
Original	Count	Less Addiction Group	110	2	0	112		
		Moderate Addiction Group	3	117	1	121		
		Higher Addiction Group	0	1	41	42		
	%	Less Addiction Group	98.2	1.8	0	100.0		
		Moderate Addiction Group	2.5	96.7	0.8	100.0		
		Higher Addiction Group	0	2.4	97.6	100.0		
Accuracy – 97.5% of Original Cases Correctly Classified								



Graph 3: Smart Phone and Internet Usage Cluster Groups Centred Position

Table 2 and Graph 3 indicates that three dominant groups has been formed are significantly differentiated by all the three Smart Phone and Internet Addiction Factors. The Discriminant Function 1 shows that WilksLamba = 0.192; Chi-square = 447.203, df = 6, and Eigen Value is 4.196, Canonical Correlation of 0.899 with P-Value of 0.000 proves that significant at 5% level of Significance. The Discriminant Function 2 with WilksLamba value of 0.998, Chi-square value of 0.642, df of 2, Eigen Value is 0.002 and Canonical Correlation value of 0.049 is not significant at 5% level of significance. Further, table 8 shows that 275 respondents are significantly grouped in three clusters namely Less Addiction Group, Moderate Addiction Group and Higher Addiction Group. The first cluster of less addiction group formed has 112 respondents followed by cluster two of moderate addiction group formed has 121 respondents and final cluster higher addiction group has formed with 42 respondents. In addition, table 8 proves that 97.5 % of such cluster classification in correct.

7.2. Significance of Mean Difference of Selected Demographic Profiles with respect to Smart Phone and Internet Usage Factors

An attempt has been made to identify the significance of mean difference between the selected demographic profiles such as, gender, nature of family, monthly family income and source of internet usage by applying Independent Samples t test and One-Way Analysis of Variance (Balaji and Jagadeesan, 2019). The results are presented in Table 3 to 6.

Table 3: Significance of Mean Difference in Demographic Profile on Smart Phone and Internet Usage Factors

Factors	Gender t-Value (P-Value)	Family Type t-Value (P-Value)	Monthly Family Income F-Value (P-Value)	Source of Internet F-Value (P-Value)
Psychological Reliance Factor	1.132 (0.288)	0.354 (0.552)	4.792 (0.003)**	3.869 (0.022)*
Physiological Reliance Factor	5.229 (0.023)*	0.265 (0.607)	0.029 (0.993)	3.384 (0.035)*
Societal Apathy Factor	0.519 (0.472)	0.057 (0.811)	2.090 (0.102)	2.082 (0.127)

Note: * Denotes: 5% Level of Significance; **Denotes: 1% Level of Significance

Table 3 indicates that gender has significant mean difference with respect of Physiological Reliance Factor of Smart Phone and Internet Usage and females have higher physiological reliance as compared to male respondents. The other factors such as, Psychological reliance factor and societal apathy factor do not have significant mean difference with respect to gender of the respondents.

Furthermore the family types indicates that do not have significant mean difference with respect of Physiological Reliance Factor, Psychological reliance factor and societal apathy factor of smart phone and internet usage of the respondents.

The one-way ANOVA results reveals that gender has significant mean difference with respect of Psychological Reliance Factor of Smart Phone and Internet Usage and lesser income

group have higher psychological reliance as compared to higher income respondents. The other factors such as, Physiological reliance factor and societal apathy factor do not have significant mean difference with respect to monthly family income of the respondents.

In addition the sources of internet have significant mean different with respect to psychological reliance factor and physiological reliance factor of smart phone and internet usage and those who are users of data card as a source of internet have higher usage as compared to other source of internet. The societal apathy factor does not have significant mean difference with respect to source of internet of respondents.

8. IMPLICATIONS AND CONCLUSION

The major aim of this empirical study is to identify the different types of cluster groups and its mean differences among college youth with respect to smart phone and internet usage in Chennai city of Tamil Nadu. The result proves that 275 college youth were significantly classified into distinctive cluster groups namely, Less Addiction Group, Moderate Addiction Group and Higher Addiction Group based on their perception towards smart phone and Internet usage. The present study also examines the role of demographic profiles for the smart phone and internet usage and result supports that few demographic profiles have significant mean differences in the perception of respondents. Therefore, college youth are suggested to use the smart phone and internet with some self-control and determination (Jiang & Zhao., 2016; Kwak & Eom., 2012). They should avoid usage of smart phone and internet for unnecessary and wasteful activities and screening time of smart phone usage should be reduced to overcome physical and mental illness caused due to higher usage of internet and smart phone (Senthil & Thangam., 2018). Male users have higher smart phone and internet usage which outnumbered by many other studies. Android and iOS applications are dominates today's mobile phone technology industry. The mobile phone manufactures are suggested to provide many more supportive features to use smart phone in a useful way rather than wasting the time in unnecessary mobile applications (Kunda & Chishimba., 2018). The maintenance of interpersonal relationship is key driver among the college youth to use smart phone and internet for excessive dependence (Shin & Lee., 2015). Hence, they are suggested to use different platform to maintain the interpersonal relationship rather than smart phones. The usage of internet and smart phone for entertainment purpose should be mitigated among college students to spend their quality time in other academic and skills enrichment activities in their day-to-day life. To conclude, penetration of smart phone and internet has been drastically increased in the fast decade due to growth of technology and life style change of the people. This study provided the different motives and purposes that college students use their smart phone and internet for social grooming, creative thoughts and societal engagement.

9. LIMITATIONS AND SCOPE FOR FURTHER RESEARCH DIRECTION

Owing to cost and time constraint, the present study was limited to sample size of 275 from students of arts and science colleges, Chennai city of Tamil Nadu. Hence, at the outset the findings of this empirical study may not be generalized to students of Tamil Nadu. The limitations associated with non-probability sample also applicable for this study since, judgment sampling technique was adopted for the primary data collection. The present study covers the age group of 18 to 23 years and student of under-graduate and post-graduate courses were alone allowed to participate in the survey. Further there are many research agendas are available for the scholars to explore the various determinants and dimensions of smart phone and internet usage among college students across the country can be explored in near future. The comparative study between the gender groups and different age groups can be conducted

to explore more valuable insights for further contribution to the literature knowledge. The impact of smart phone usage on academic performance of the college students would be eye opener for student community to effectively use the smart phone and internet in a useful way in future.

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