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IMPACT OF TECHNOLOGICAL INNOVATION ON PRODUCT DEVELOPMENT AND PROMOTION IN MOBILE PHONE INDUSTRY: AN EMPIRICAL STUDY

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Abstract
Technological innovation not only plays a significant role in performance improvement but also works as an essential competitive tool.The mobile phone industry undoubtedly has evolved over time with an enormous speed in all the manufacturing industries based on technology. The integration of technological innovation particularly along with the marketing mix elements is remained an untouched field of research. The study was designed to explore the relationship of technological innovation with product development and product promotion in mobile phone industry. The data was collected from marketing managers, operation managers and other employees of different mobile phone companies. A total of 195 useable questionnaires were collected. Statistical tools chi-square and ANOVA have been used on the data to test the hypotheses. The findings show that technological innovation has a significant impact on product development and product promotion in mobile phone industry.

Keywords: Technological innovation, Product development, Product Promotion.

INTRODUCTION

Markets are driven by the innovative technology with the dynamic industrial structure in present scenario. Innovative technologies have created industries which did not exist some years before. The rapid creation of advanced knowledge and its efficient execution have produced an unpredictable outcomes with new features. Technological innovation influences the marketing in numerous ways. It creates innovative products on reasonable prices, advanced virtual platforms to promote and sale the products. The use of technological innovation is something which has always influenced marketing development within the mobile phone industry. The mobile phone industry got changed because of lot of rapidly changing market dynamics, such as increasing market penetration, intense cost competition, rapidly shrinking product life cycles and product customization. Now,it has become important for the organizations to build the business strategies keeping in mind the significant impact of technological innovation on market.

The Indian telecommunication industry has developed from only a few users to 980 million subscriber at the end of May 2015 and the growth is being expected to continue for a longer period. India has become the second largest mobile handset market in the world after China and is claimed to become much more even larger market through the unit shipment of INR 208.4 million in the year 2016 with the compound annual growth rate (CAGR) of 11.8% from 2010 to 2016. The mature Indian mobile phone consumers like to purchase high end handsets while young demographics use mobile web 2.0 technologies which would take the mobile phone market to INR 350.5 billion in 2016. The extraordinary growth of mobile phone users, enhancing use of information and media services, and continuous growth of mobile technology has resulted into the changed product strategy of mobile phone companies. Technological innovation has tremendous impact on the product strategy of mobile phone industries which include product innovations, pricing strategies to be adopted, developing and targeting the distribution channels and developing the promotional campaign. The change in the product strategies has provided the end consumers and also business users different innovative value added mobile services. The mobile phone industry is expanding by the support of technological innovation. In present time, technological innovations have become the basis for innovative products and services being industrialized. So many innovations are the significant results of advanced technology. It has developed various platform through the information technology like search engines websites, social media network, e-commerce websites and many more to promote the product.

LITERATURE REVIEW

Tis (1980) examined different types of relationship between technology and marketing keeping new product development as a central research point.Freeman (1982) described that process which includes the manufacturing, technical design, R&D, management and commercial activities that are involved in marketing of an innovative product. Intense international competition, rapid changing technologies and fragmented and demanding diverse markets are very much related to each other because of product innovation (Wheelwright & Clark, 1992). Marketing and technological resources should be combined together to create new abilities which result more values for the organization and its customers (Gingington&Zorob, 1997). There is an interface between marketing and technology (Mormen&Slotorger, 1999). Firms having a focus on marketing actions are more likely to get better abilities for getting the customer satisfaction as compared to competitors (Baker & Sinkula, 1999) and it also includes increased customer satisfaction, more business opportunities and more access to new

information and resources for developing innovative competitive processes or products (Day, 1994; Rust *et al.*, 2004). Organizations can improve customer acquisition and retention by integrating technological innovation into their marketing practices to foster rich interactions with their customers (Brodie, Winklhofer, Coviello, & Johnston, 2007; Coviello, Milley & Marcolin, 2001).

The nature, attributes of advanced and innovative product have a significant impact upondiffusion and adoption of product by the market. Different empirical researches have indicated that product attributes have influence on the growth pattern (Peres, Mahajan & Muller, 2010).Fred et.al. (2003) described that marketing has changed in the recent past due to the presence of information technology. Advertisers are changing the ways in which they perform all the advertisement functions. New issues have been emerged on these aspects which were not existed before like branding and yellow pages advertising and also the internet advertising. The study further states that there is a big transformation from telemarketing to tele-servicing for earning the huge profits.Lee et al. (2003) examined the impact of innovation on producers and consumers. The study found out that innovativeness affect producers and consumers in different ways and these differences have strategic impact when commercializing highly innovative products. Product innovation is considered in multidimensional approach and every dimension is tested separately. Koskiand Kretschmer(2007) studied the relation between new product development and firm value in mobile handset production from 1992-2002. The research study analyzed that most of the products which are launched in the market are imitative, both types of innovations i.e. radical and incremental increase the firm market share. In a market of rapid technological advancement and cut throat competition like mobile handset market, following a technological leadership strategy is risky as the benefits achieved can be short lived if it can be imitated easily and quickly.

Abu (2009) researched on technology and innovation in the diffusion process of 3G mobile phones in Japan. The study emphasized that technology and innovation has become more important determinants of corporate competitiveness, and thetelecommunications sector is no exception. Technological development, embodied in innovative functions from first generation (1G) to third generation(3G) systems has played significantly important roles in the growth and upheavals of the Japanese mobilephone market. Giachetti and Marchi (2010) studied the evolution of firm's product strategy over the life cycle of technology based industries using a case study of the global mobile phone industry from 1980-2009. The researchers adopted the industry life cycle approach to examine the changing foundations of product strategy development in the world wide mobile phone industry. The research analyzed that mobile phone manufactures are changing their product strategies radically over the life cycle of industry due to the changes in technology and consumer preferences. The industry has worked out process innovation that is also taking place in the product innovation. The researchers concluded that product innovation has played a keen role in the maturity stage of industry.

RESEARCH METHODOLOGY

The study is empirical in nature. The data has been collected using primary and secondary sources. The secondary sources of data were books, journals, magazines and different websites. Primary data has been collected using structured questionnaire through survey method. The study is based on convenience sampling. A five point Likert Scale was used for collecting the responses from the respondents. All statements were recorded on a scale ranging from 1 to 5, where 1 denotes strong disagreement and 5 denotes strong agreement. The data was obtained from 195 employees of mobile phone companies.

HYPOTHESES

The following hypotheses have been proposed for the study.
$H_0$1: There is no significant impact of technological innovation on product development strategies.
H_a1: There is a significant impact of technological innovation on product development strategies.
$H_0$2: There is no significant impact of technological innovation on promotion strategies.
H_a2: There is a significant impact of technological innovation on promotion strategies.

DATA ANALYSIS & FINDINGS

Table 1 provides a summary of respondents on the basis of different demographic variables.

Table 1: Demographic Characteristics of Respondents

Demographic Variable	Demographic Characteristics	Frequency	Percentage (%)
Gender	Male	29	14.9
	Female	166	85.1
Age	18-25 Years	41	21.0

	26-35 Years	121	62.1
	36 -50 Years	22	11.3
	More than 50 Years	11	5.6
Education Qualifications	High School	45	23.08
	Graduate	58	29.74
	Post Graduate	53	27.18
	Professional	39	20.00
Work Experience	Upto 5 Years	58	29.74
	6-10 Years	49	25.13
	11 -20 Years	78	40.00
	More than 20 Years	10	5.13

Hypothesis 1:
$H_0$1: There is no significant impact of technological innovation on product development strategies.
H_a1: There is a significant impact of technological innovation on product development strategies.

To test the hypothesis, two statistical tools have been used i.e. Chi-square and ANOVA. For this total respondents have been divided into five categories on the basis of their responses to the influence of technological innovation on mobile phone industry, which has been considered as an independent variable and then to check the impact of technological innovation, two important factors of product strategies have be taken i.e. development of new design model and enhancement of manufacturing quality of mobile handsets. Table 2 describes cross tabulation and the table3 shows the result of chi-square as 29.125 and resulting probability value is .023. The associated probability value p is less than the significance level 0.05 ($p<0.05$), so that the null hypothesis is rejected. Table 4shows the result of ANOVA on the same variable. In this case the value of F is found to be 4.282 with 4 and 190 degrees of freedom, resulting probability value 0.002. Because the associated probability is less than the significance level 0.05, so in that case also null hypothesis is rejected. It appears through the results that technological innovation directly facilitates development of new design models of the handsets which can support the new applications and software.

Table2: Cross Tabulation: Technological Innovation & Development of New Design Model

Count		Technological Innovation					Total
		1	2	3	4	5	
Development of New Design Model	1	7	7	5	5	5	29
	2	5	7	5	5	6	28
	3	6	5	5	7	7	30
	4	6	8	9	12	6	41
	5	7	5	9	11	35	67
Total		31	32	33	40	59	195

Table 3: Result (Chi-Square)

	Value	df	Asymp. Sig. (2- sided)
Pearson Chi-Square	29.125[a]	16	.023
Likelihood Ratio	28.753	16	.026
Linear- by- Linear Association	14.050	1	.000
N of Valid Cases	195		

Table 4: Result (ANOVA)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	34.099	4	8.525	4.282	.002
Within Groups	378.281	190	1.991		
Total	412.380				

Second dependent variable for the same hypothesis is taken as enhancement of manufacturing quality. In this case also, chi-square and ANOVA tests have been used. Table 5 and 6 illustratecross tabs and chi-square result respectively. The table 6 shows the value of chi-square 32.986 andresulting probability is 0.007. The table 7 shows the result of ANOVA for the same variable. The F value was found 4.449 with the 4 and 190 degrees of freedom and resulting probability is 0.002. As per both the tests the associated probability value is less than the significancelevel 0.05 i.e. ($p<.05$), so that in this case also null hypothesis is rejected. So the results show that technological innovation plays an important role in enhancement of manufacturing quality of handsets through the applications of advanced techniques.

Table 5: Cross Tabulation: Technological Innovation & Manufacturing Quality

Count		Technological Innovation					Total
		1	2	3	4	5	
Manufacturing Quality	1	6	7	6	6	6	31
	2	6	5	6	6	5	28
	3	6	7	5	5	6	29
	4	7	8	8	11	5	39
	5	6	5	8	12	37	68
Total		31	32	33	40	59	195

Table 6: Result (Chi-Square)

	Value	df	Asymp. Sig. (2- sided)
Pearson Chi-Square	32.986[a]	16	.007
Likelihood Ratio	33.020	16	.007
Linear- by- Linear Association	13.926	1	.000
N of Valid Cases	195		

Table 7: Result (ANOVA)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	36.481	4	9.120	4.449	.002
Within Groups	389.468	190	2.050		
Total	425.949	194			

Hypothesis 2:
$H_0$2: There is no significant impact of technological innovation on promotion strategies.
H_a2: There is a significant impact of technological innovation on promotion strategies**.**

In order to test the above hypothesis for finding out the impact of technological innovation on promotional strategies. The researcher took independent variable technological innovation like before and two dependent variables development of new promotional tools and effective marketing communication have been taken.

Table8 and table 9 show Cross tabs and result of chi-square. The value of Chi-square is found to be 29.100 with the associated probability value .023. The associated probability value is less than the significance level ($p<.05$). Table 10 shows the results of ANOVA test. The F value is found to be 27.233 with 4 and 190 degrees of freedom and the associated probability value found .012. Hence through this test also the associated probability value is less than the significance level ($p<.05$). So the null hypothesis through both the tests is rejected and the results show the high association between technological innovation and development of new promotional tools to increase the promotion of the products for increasing the sales.

Table 8: Cross Tabulation: Technological Innovation & Development of New Promotional Tools

Count		Technological Innovation					Total
		1	2	3	4	5	
Development of New	1	6	5	7	7	6	31
	2	5	6	7	7	8	33
	3	5	7	5	9	6	32

	4	8	8	8	8	5	37
Promotional Tools	5	7	6	6	9	34	62
Total		31	32	33	40	59	195

Table 9: Result (Chi-Square)

	Value	df	Asymp. Sig. (2- sided)
Pearson Chi-Square	29.100[a]	16	.023
Likelihood Ratio	28.453	16	.028
Linear- by- Linear Association	6.384	1	.012
N of Valid Cases	195		

Table 10:Result (ANOVA)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	27.233	4	6.808	3.296	.012
Within Groups	392.426	190	2.065		
Total	419.659	194			

Second dependent variable effectiveness of marketing communication is taken to test the hypothesis. Table 11shows cross tabulation and table 12 gives the results of Chi-square test. The resulted Chi-square value is found to be 27.155 and associated probability value .040. Table 13shows the result of ANOVA test. The F value is found to be 4.463 with 4 and 190 degrees of freedom and associated probability value is .002. Both test show the associated probability value less than significance level i.e. ($p<.05$). Hence the null hypothesis is rejected and result shows that there is a strong association between technological innovation and effective marketing communication which enhances the information assessment by the customers to know more about the products.

Table 11: Cross Tabulation: Technological Innovation & Effectiveness of Marketing Communication

Count		Technological Innovation					Total
		1	2	3	4	5	
Effectiveness of Marketing Communication	1	9	6	6	5	6	32
	2	7	5	5	5	6	28
	3	5	6	5	6	7	29
	4	5	7	9	11	6	38
	5	5	8	8	13	34	68
Total		31	32	33	40	59	195

Table 12: Result (Chi-Square)

	Value	df	Asymp. Sig. (2- sided)
Pearson Chi-Square	27.155[a]	16	.040
Likelihood Ratio	26.571	16	.047
Linear- by- Linear Association	16.038	1	.012
N of Valid Cases	195		

Table 13: Result (ANOVA)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	37.061	4	9.265	4.463	.002
Within Groups	394.457	190	2.076		
Total	431.518	194			

CONCLUSION

Technological innovation has contributed to the advancement of mobile phone industry. Mobile phone is playing an important role by bringing people closer to each other and even innovation has also converted mobile phone from a communication device to multi-tasking device due to convergence of technology. Technological innovation has caused changes in marketing which are related to innovative methods and which have been applied in marketing to introduce

changes in product, placement, pricing and promotion of product. The technological innovation has also developed different innovative tools like social networking sites, apps, blogs, professional websites etc. These tools are facilitating quick promotion of mobile phones.

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