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The Influence of Social Media on Purchase Decisions of Internet of Things (IoT) Devices

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Abstract: Today, social media advertisements have been playing a vital role in developing brand awareness and governing consumer purchase choices. This study investigated the role of social media advertisements in influencing consumer purchase choices of Internet of Things (IoT) devices at four universities in Karachi, Pakistan. The survey study was conducted by selecting 100 students using simple random sampling. Frequency distribution analysis of the survey responses was performed, and correlation and regression analyzes performed to identify the impact of various variables on the purchase decisions of students. From the demographic variables, income was found to be positively associated with the purchase of IoT devices, whereas no correlation was found for the influence of age or gender. Moreover, students' responses indicated that their purchase choices were influenced by social media advertisements and online reviews. However, the limited present use of social media by the IoT companies has also been highlighted as majority of the participants indicated that the IoT advertisements over social media are uncreative and that much awareness about IoT products was not created via social media. The findings are expected to help the IoT sector develop efficient social media marketing strategies.

Keywords: Internet of Things, students, social media.

社交媒体对物联网(物联网)设备购买决策的影响

摘要：如今，社交媒体广告在提高品牌知名度和管理消费者购买选择方面发挥着至关重要的作用。这项研究调查了巴基斯坦卡拉奇四所大学的社交媒体广告在影响消费者物联网设备购买选择方面的作用。该调查研究是通过简单随机抽样选择100名学生进行的。对调查结果进行频率分布分析，并进行相关性和回归分析，以确定各种变量对学生购买决策的影响。从人口统计变量来看，收入与物联网设备的购买呈正相关，而年龄或性别的影响则没有发现相关性。此外，学生的回答表明，他们的购买选择受到社交媒体广告和在线评论的影响。然而，物联网公司目前对社交媒体的使用有限也受到了重视，因为大多数参与者表示，社交媒体上的物联网广告缺乏创意，并且人们对物联网产品的认识并不是通过社交媒体创造的。研

究结果预计将帮助物联网行业制定有效的社交媒体营销策略。

关键词：物联网、学生、社交媒体。

1. Introduction

Social media have had a significant impact on the way advertisements are created, distributed, and consumed. These platforms have powerful algorithms that allow advertizers to target specific audiences based on factors such as demographics, interests, and behavior. This makes advertising more effective and cost-efficient, as advertizers can reach the right people with their message [1]. Moreover, social media platforms have enabled brands to create user-generated content (UGC) campaigns, where users create content for the brand in exchange for incentives. This allows brands to leverage their customers' creativity and increase engagement with their products or services.

Influencer marketing has also become an emerging concept related to social media. Influencers have become an integral part of advertising on social media platforms [2]. Brands collaborate with influences who have large following to promote their products or services to their audience. This type of marketing is effective because it allows brands to reach a highly engaged and targeted audience. Similarly, social media has allowed brands to build their brand identity and voice by creating content that resonates with their audience. This has led to more creative and personalized advertisements that stand out in a crowded market. Finally, social media provides real-time feedback on advertisements, allowing brands to adjust their campaigns on the fly. As a result, advertizers may respond quickly to consumer feedback and optimize their campaigns for maximum impact. This article focuses on the use of social media advertising for the purchase of Internet of Things (IoT) products among Pakistani youth.

Internet of Things (IoT) refers to the network of physical devices, vehicles, buildings, and other items embedded with sensors, software, and connectivity that enables them to collect and exchange data over the internet. Data collected by these devices can be analyzed and used to optimize performance, improve efficiency, and enhance functionality in various industries such as manufacturing, healthcare, agriculture, and transportation [3]. Examples of IoT devices include smart thermostats, fitness trackers, and connected cars. Personal IoT products are becoming increasingly popular in Pakistan for several reasons [4]. First, these products offer convenience by automating tasks and reducing the need for manual input; for example, smart thermostats can automatically adjust the temperature based on user preferences, or smart locks can unlock their door. Second, IoT products can improve efficiency by streamlining processes and reducing waste; for example, smart appliances can automatically adjust energy usage based on usage patterns, reducing energy consumption and costs. Third, IoT products can be customized to fit individual preferences and needs; for example, smart lighting systems can be programed to create different moods or settings depending on the time of day or activity.

There are various emerging IoT applications in Pakistan. Health and wellness have become one of the most critical sectors for IoT in the country as these products can help individuals manage their health and wellness by providing real-time data on fitness, nutrition, and health metrics; for instance, wearable devices can track activity levels, heart rate, and sleep patterns, providing insights into overall health and wellness [5]. Similarly, due to the degrading law and order situation in Pakistan, IoT devices are heavily being used for ensuring security as they can enhance security by providing real-time monitoring and alerts for potential threats. For example, smart home security systems can alert homeowners when there is suspicious activity or a breach.

In addition to other consumables, social media platforms are increasingly being used to advertise Internet of Things (IoT) products. As the market for IoT devices continues to grow, companies are leveraging social media to reach a wider audience and promote their products. Social media marketing provides a powerful way to target specific audiences and generate interest in IoT products. For example, companies today use Facebook or Instagram ads to target individuals who are interested in smart home technology or wearable devices [6]. Similarly, LinkedIn has also been used to reach businesses or professionals interested in IoT solutions for their organizations. Furthermore, these platforms also provide a way for companies to showcase the features and benefits of their IoT products through creative content such as videos, photos, and interactive posts. Additionally, social media can be used to build a community around a specific IoT product or brand, where users can share their experiences and provide feedback.

This article aims to study the role of social media in the purchase decisions of IoT products for university students in Pakistan. Although some studies are found in the literature that deal with the purchase of smart gadgets such as phones, Fitbits, and smart watches, to the best of our knowledge, no study focusing on the

factors affecting purchase decisions of IoT devices has been conducted in the past. This study is important for several reasons. First, IoT products are becoming increasingly popular in Pakistan, and understanding how social media affects students' purchase decisions can help businesses in this sector better target their marketing efforts. Second, we specifically surveyed university students, who represent a significant consumer group with a high potential for future spending. Understanding the factors that influence their purchase decisions can help businesses develop products and marketing strategies that resonate with this demographics. Finally, our study adds to the limited research on the impact of social media on purchase decisions in Pakistan, providing valuable insights for businesses, policymakers, and academics in this field. We conducted a structured survey and performed correlation, chi-square, and regression analyzes to assess and compare the impact of various factors on the purchase decisions of IoT products.

The rest of this article has been organized as follows: Section 2 presents a brief literature review; section 3 details the research methodology; section 4 presents the results and analysis; section 5 discusses the implications and limitations; and Section 6 concludes the article and offers direction for future research.

2. Literature Review

2.1. Differences in Social Media Marketing and Traditional Media Marketing

Traditional marketing such as direct marketing or brand marketing are push-based, one-way and interrupt-driven older marketing techniques, which have increasingly been replaced by social media marketing [7]. The flow of information in direct marketing is from brand to consumer and only brand-generated content reaches the customer. In traditional marketing, the company interrupts the customers' activities and pushes their information to create brand awareness. On the other hand, social media marketing is not a form of push marketing, as the customers themselves click on the links to get the product information and the company just needs to place the advertisements strategically in an attractive manner.

Moreover, social media marketing provides marketers with certain advantages that are not available with traditional marketing media such as TV. For example, companies cannot form social groups on traditional media, nor can customers search for product reviews or form virtual brand communities on traditional media [8]. On social media, the organization not only increases its visibility and brand awareness through posting its own content, but the availability of online customer reviews is an important opportunity for the organizations to market their products. The social media channel is an important means of communicating thoughts and reviews about the products [9]. Achieving brand trust through social media marketing is therefore easier for the company as customers often trust consumer-generated content more than company advertisements.

The reach of social media advertisements has also been increasing significantly compared to conventional advertisements. As of December 2022, Facebook reported having 2.96 billion active users. However, it is important to note that this number is constantly changing [10]. This increased usage of social media is not only because of teenagers but also includes the members of generation X who are now 35 to 45 years of age. Hence, it is safe to say that social media is an significant platform for marketing and shaping opinions and perceptions due to the inclinations of a large number of people leaning toward its usage.

2.2. Factors Affecting Social Media Perceptions

Several factors can affect the effectiveness of social media advertising campaigns. First, targeting the right audience is crucial because irrelevant ads are likely to be ignored or even disliked by users [11]. To achieve this, businesses need to understand their target audience demographics, interests, behaviors, and preferences and tailor their ads accordingly. Social media platforms offer various targeting options such as age, gender, location, interests and behaviors to help businesses reach the right people.

Second, the content and creatives of social media ads are critical for grabbing users' attention and conveying the intended message. The ads should be visually appealing, concise, informative, and aligned with the brand's values and tone [12]. Businesses need to experiment with different ad formats, such as images, videos, carousels, stories, and interactive elements, to see what resonates with their audience the most. In addition, the ads should have a clear call-to-action, such as "Shop Now," "Learn More," or "Sign Up," to encourage users to take the desired action [13].

Third, the timing and frequency of social media ads can impact their effectiveness. Bombarding users with too many ads can lead to ad fatigue and annoyance, while showing ads at the wrong time, such as during working hours or late at night, can result in lower engagement. Therefore, businesses should optimize the timing and frequency of their ads based on their target audience's behaviors and habits.

Finally, the social media platform and its algorithm can affect the performance of ads. Different platforms have different strengths and weaknesses, user bases, and ad formats, and businesses need to choose the ones that align with their goals and audience [14]. Moreover, social media algorithms prioritize content that generates engagement, such as likes, comments, and shares, and businesses need to create content that encourages such interactions to increase the reach and

impact of their ads.

2.3. Effects of Social Media Marketing

Social media has emerged as one of the major business opportunities for organizations today. Consumers have started to develop trust in brands that have active social media presence since the company and other consumers of the products are able to deeply connect through this technology. Due to the increasing influence of social media on consumers, organizations have been taking social media promotion initiatives at a much higher rate as compared to the previous years. In fact, organizations desiring to achieve a competitive market position today cannot sustain without having an efficient social media marketing strategy. This is the reason why major brands all over the world have recognized the need of the hour and have been developing innovative marketing campaigns to launch and promote their products on social media. This section highlights some major effects of social media on consumer behavior.

The perceptions of brands have been reported to be impacted by their social media presence. The authors in [15] investigated the impact of social media on the brand perceptions of customers. 504 users of Facebook were surveyed to obtain information on customers' perceptions about the purchase decision, brand equity, and brand attitude developed due to the company's presence on social media and its online communication strategies. The analysis focused on the industries of clothing, nonalcoholic beverages, and mobile network operators, and was based in Poland. An important objective of the study was to assess the different impacts of user & firm-generated social media content. It has been identified that both brand attitude and brand equity are influenced by user-generated social media content. On the other hand, only brand attitude is influenced by the firm generated social media content. Similarly, brand equity and brand attitude has a positive impact on consumer purchasing decisions.

Consumers today are able to communicate their opinion through social media, online blogs, product reviews and recommendations to their friends and family. All of these elements play a vital role in revolutionizing consumer-to-consumer marketing [16]. Therefore, social media offers people the chance of developing virtual brand communities, which significantly help them make purchase decisions.

2.4. Youth and Social Media

Social media have become an integral part of the lives of many young people today. It provides a platform for individuals to connect, share ideas and express themselves. The youth in particular are avid users of social media platforms such as Facebook, Instagram, and Twitter, spending several hours each day scrolling through their feeds, interacting with their peers, and consuming content. Through social media, young people are exposed to various information and experiences, which can shape their attitudes, beliefs, and behaviors [17]. Social media also provides opportunities for young people to discover new products and services and to make informed decisions about their purchases.

The impact of social media advertising on young people is significant. With the rise of social media advertising, businesses are increasingly using these platforms to target young people and promote their products. The constant exposure to ads on social media can influence the purchasing decisions of young people, especially those who are more susceptible to advertising messages. Social media advertising can also create a sense of urgency or FOMO (fear of missing out) among young people, encouraging them to make impulsive purchasing decisions [18]. Additionally, social media influences and celebrities who endorse products on these platforms can also have a significant impact on young people's purchasing decisions.

2.5. Technology Industry and Social Media in Pakistan

Social media advertising has become an essential tool for businesses in Pakistan to increase brand awareness, engage with their customers, and ultimately drive sales. Particularly, the technology sector has been relying on social media marketing in Pakistan for several reasons. First, social media platforms provide businesses with a cost-effective way to reach their target audience and promote their products. Advertising on social media platforms is often cheaper than traditional advertising methods such as television or print ads, making it an attractive option for businesses with limited budgets. Second, social media platforms allow businesses to target specific audiences based on demographics, interests, and behaviors, making their advertising efforts more effective and efficient. This is particularly important for the technology sector, where the target audience is often tech-savvy and can be more easily reached through social media platforms by offering personalized content [19]. Finally, social media advertising provides businesses with real-time feedback and data on the performance of their advertising campaigns, allowing them to make adjustments and improve their marketing strategies in real-time. These benefits have made social media advertising a popular tool for businesses in the technology sector in Pakistan to promote their products and increase their brand awareness.

Despite the widespread use of social media marketing by businesses in the technology sector in Pakistan [20], IoT products are not yet being advertised as heavily as other technology products. While social media platforms offer an effective and cost-efficient

way to reach a large audience, businesses promoting IoT products may face challenges in reaching their target audience due to the relatively new and emerging nature of the IoT industry in Pakistan. Additionally, the IoT industry in Pakistan is still in its nascent stages and has yet to reach mainstream adoption [21], which may also contribute to the lower levels of advertising for IoT products. Nonetheless, with the growing demand for smart technology and the increasing adoption of IoT devices worldwide, it is likely that more advertising efforts will be made for IoT products in the future.

3. Research Methodology

Simple random sampling was used for selecting the participants of this research from 4 leading universities of Karachi, Pakistan; these universities included Institute of Business Administration (IBA) main campus, DHA Suffa University, Iqra University main campus and University of Karachi. 100 students were selected for survey. This sampling approach has been taken to minimize the chance of bias as it offers a random selection from the entire population set [22]. The data for the survey was collected using a structured questionnaire of 11 questions (Table 1). In addition, demographic information on age, gender, the income group, and whether the participants had recently purchased an IoT product was also collected.

Table 1 Survey questions to assess impact of social media on purchase decisions

S. No.	Question
Q1	I notice advertisements on social media such as Facebook
Q2	Social media have increased my information about available IoT products
Q3	The availability of social media has increased my awareness of technology brands when making purchase decisions
Q4	Social media have changed my view about IoT products
Q5	I am more likely to purchase a technology product that has been extensively promoted on social media before launch
Q6	The flow of information has become quicker with social media marketing
Q7	The advertisements of IoT devices impact me
Q8	Social media advertising campaigns influence my decision on buying IoT devices
Q9	I rely on online reviews and they influence my purchase decisions for technology products
Q10	Social media advertising campaigns for IoT products are very creative
Q11	Traditional media of advertisement are more effective for technology products than their social media variants

4. Results and Analysis

4.1. The Impact of Age, Gender and Income Group

To determine the impact of age, gender, and income group on the purchase of IoT devices, we used correlation, chi-square, and regression analyzes to examine the relationships between these variables. Correlation analysis provides information on the strength and direction of the linear relationship between two variables; chi-square analysis provides information on the association between two categorical variables and regression analysis provides information on the impact of each independent variable on the dependent variable, controlling for the other independent variables. We analyzed the impact of age, gender, and income on the purchase of IoT products using each of these statistical tests.

First, we calculated the correlation coefficients between each independent variable (age, gender, income group) and the dependent variable (purchase of IoT devices) using Pearson's correlation coefficient. The results of the correlation coefficient analysis are presented in Table 2.

Table 3 Correlation coefficient analysis for demographic variables and purchase decisions of IoT devices

	Age	Gender	Annual Income	IoT Product Purchase
Age	1.0000000	0.0040031	0.0989211	-0.0781768
Gender	0.0040031	1.0000000	0.0845405	-0.0216717
Annual Income	0.0989211	0.0845405	1.0000000	0.1557913
IoT Product Purchase	-0.0781768	-0.0216717	0.1557913	1.0000000

The above results show that there is a weak negative correlation between age and the purchase of IoT devices, indicating that younger participants are slightly more likely to purchase IoT devices. There is also a weak negative correlation between gender and the purchase of IoT devices, indicating that females are slightly less likely to purchase IoT devices. Finally, there is a weak positive correlation between income group and the purchase of IoT devices, indicating that participants with higher incomes are slightly more likely to purchase IoT devices.

Furthermore, we also conducted a chi-square test of independence to test the impact of each independent variable on the purchase decision of IoT products. These results are shown in Table 3.

Table 3 Chi-Square test for demographic variables and Purchase decisions of IoT devices

Chi-Square	df	p-value	
Age vs. IoT Purchase	0.245	1	0.620
Gender vs. IoT Purchase	0.001	1	0.972
Income vs. IoT Purchase	0.821	1	0.364

Chi-square and correlation analyzes were conducted to explore the relationship between age, gender, income, and the decision to purchase an IoT product. The chi-square test found no significant association between any of the variables and IoT purchase, while

the correlation analysis suggested a weak positive correlation between income and IoT purchase. Therefore, we also conducted regression analysis to determine the true impact of these variables on the purchase of IoT devices.

To determine the impact of age, gender, and the income group on the purchase of IoT devices more accurately, we also conducted a linear regression analysis.

We used the following regression model:

$$IoT\ Purchase = b_0 + b_1*Age + b_2*Gender + b_3*Income\ Group + e \quad (1)$$

where:

IoT purchase is the dependent variable, and *age*, *gender*, and *income group* are the independent variables;

b_0 is the intercept, b_1, b_2, and b_3 are the regression coefficients, and e is the error term.

It has been seen using Regression Analysis (Table 4) that income has the most significant impact on the purchase of IoT devices, as evidenced by the high coefficient value and low p-value. On the other hand, age and gender have little impact on the Purchased variable, as evidenced by their low coefficient values and high p-values.

Table 4 Regression analysis for impact of demographic factors on purchase decision of IoT devices

Regression Analysis for Age				
	Coefficients	**Standard Error**	**t-Statistic**	**P-value**
Intercept	0.715	0.123	5.81	0.000
Age	-0.003	0.007	-0.46	0.646
Regression Analysis for Gender				
	Coefficients	**Standard Error**	**t-Statistic**	**P-value**
Intercept	0.678	0.066	10.28	0.000
Gender	-0.037	0.062	-0.60	0.548
Regression Analysis for Income				
	Coefficients	**Standard Error**	**t-Statistic**	**P-value**
Intercept	0.065	0.057	1.14	0.256
Income	0.316	0.031	10.20	0.000
Regression Analysis for Recently Purchased				
	Coefficients	**Standard Error**	**t-Statistic**	**P-value**
Intercept	0.320	0.049	6.53	0.000
Age	-0.001	0.005	-0.21	0.833
Gender	-0.025	0.044	-0.56	0.575
Income	0.263	0.025	10.32	0.000

The analysis presented in this section suggests that income is the most significant predictor of the likelihood of making a purchase. Age and gender, on the other hand, have little to no impact on the likelihood of making a purchase. These findings can be used by businesses to better understand their customers and to target their marketing efforts toward those with higher incomes. Additionally, businesses can use this information to develop pricing strategies that are tailored to their customers' income levels.

4.2. Influence of Social Media

The demographic distribution of survey participants is shown in Fig. 1 and their survey responses for questions listed in Table 1 are presented in Fig. 2.

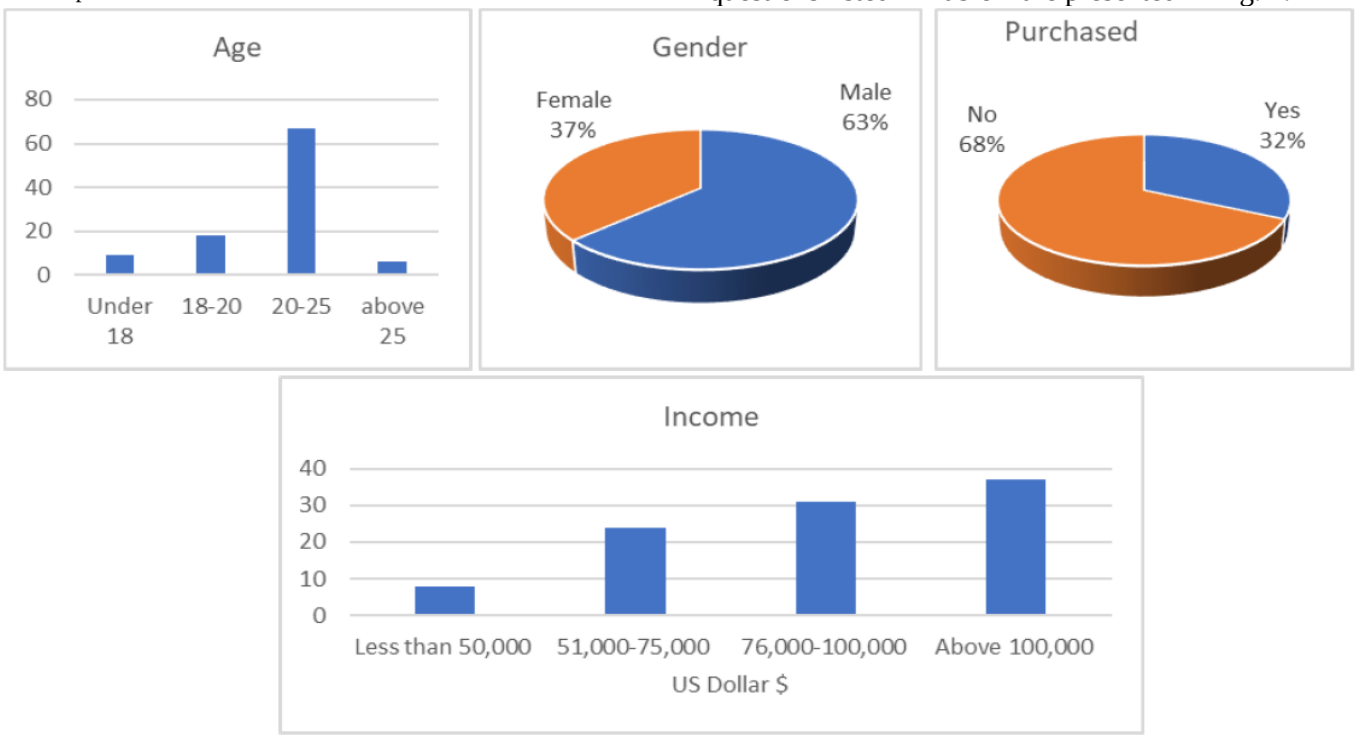

Fig. 1 Demographic characteristics of survey respondents

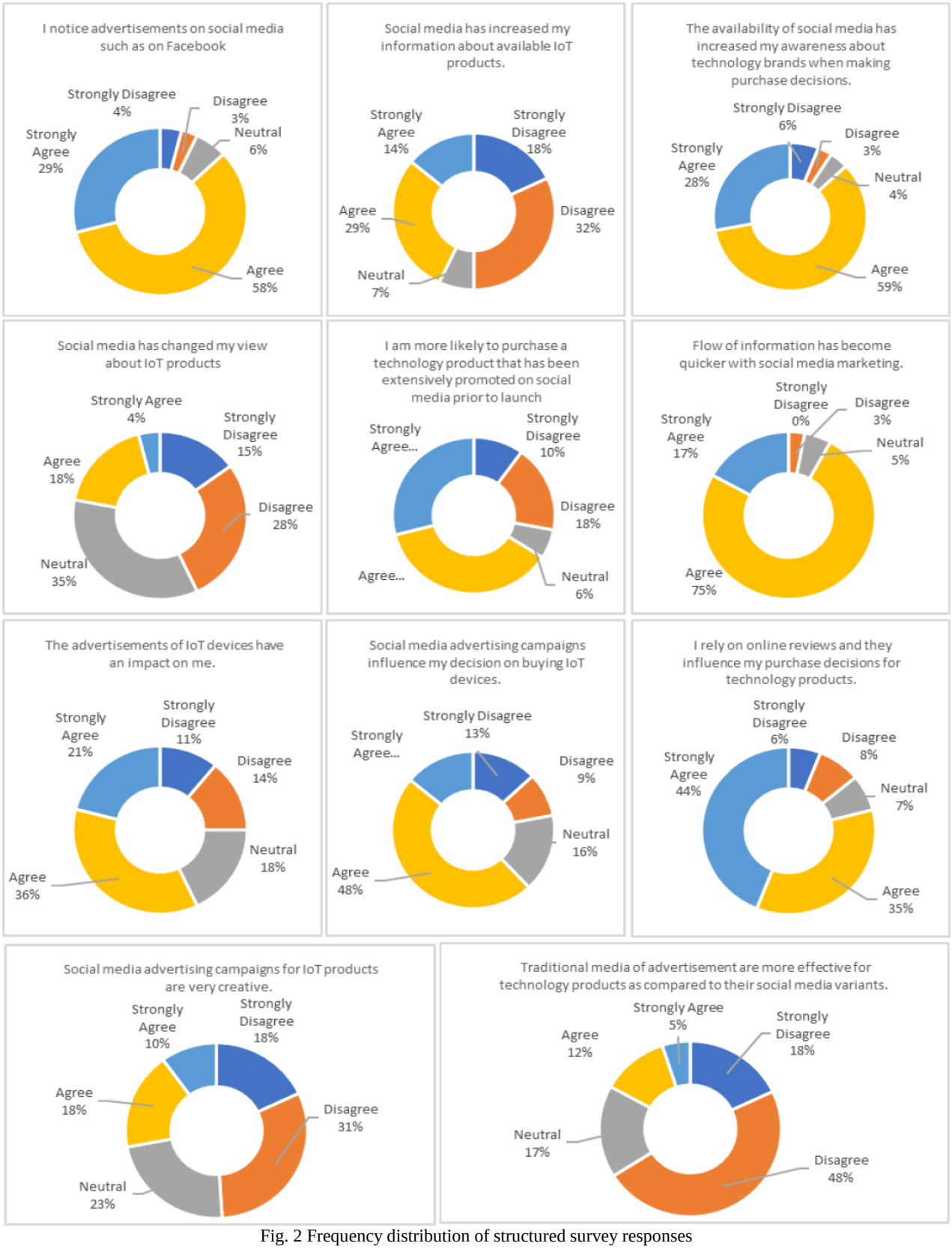

Fig. 2 Frequency distribution of structured survey responses

The findings in Fig. 1 can be quickly summarized:

1. Social media advertising is noticeable to the majority of participants.

2. Social media have not served as an effective channel for increasing awareness of IoT products.

3. Social media plays a role in shaping the awareness of technology brands.

4. Social media do not have a significant impact on the participants' views of IoT products.

5. Social media can be an effective channel for promoting technology products.

6. Social media is an effective channel for quickly disseminating information.

7. IoT device advertising may be effective in

influencing consumer behavior.

8. Social media advertising can be effective in influencing purchase decisions regarding IoT products.

9. Online reviews are an important factor in their purchase decisions.

10. Social media advertising for IoT products has not been perceived as particularly creative.

11. Social media can be a more effective channel for advertising technology products compared to conventional media.

Correlation coefficients for each question listed in Table 1 have been computed as shown in Table 2.

The correlation table shows the Pearson correlation coefficient for each pair of questions. The values range from -1 to 1, with -1 indicating a perfectly negative correlation, 0 indicating no correlation, and 1 indicating a perfectly positive correlation. Looking at the table, we can see that some questions are highly correlated with one another, while others are not. The findings are summarized below:

Q1 (I notice advertisements on social media such as on Facebook) is positively correlated with Q5 (I am more likely to purchase a technology product that has been extensively promoted on social media before launch) with a correlation coefficient of 0.55. This suggests that respondents who notice social media advertisements are more likely to be influenced by them when making purchase decisions.

Q1 is also positively correlated with Q8 (Social media advertising campaigns influence my decision on buying IoT devices) with a correlation coefficient of 0.59. This indicates that those who notice social media advertisements are more likely to be influenced by them when making purchase decisions for IoT devices.

Q2 (Social media has increased my information about available IoT products) is positively correlated with Q6 (Flow of information has become quicker with social media marketing) with a strong correlation coefficient of 0.72. This suggests that the respondents who feel that social media has increased their awareness of IoT products are also likely to feel that the flow of information has become quicker with social media marketing.

Table 5 Correlation analysis between each pair of survey questions

	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**	**Q11**
Q1	1.00	0.20	0.43	-0.16	0.33	0.42	-0.01	0.24	0.41	0.15	0.08
Q2	0.20	1.00	0.63	0.05	0.43	0.29	0.22	0.24	0.51	0.47	0.01
Q3	0.43	0.63	1.00	0.01	0.60	0.26	0.12	0.40	0.38	0.29	0.05
Q4	-0.16	0.05	0.01	1.00	-0.08	0.06	-0.20	-0.11	0.11	-0.05	0.08
Q5	0.33	0.43	0.60	-0.08	1.00	0.24	0.14	0.26	0.38	0.10	0.05
Q6	0.42	0.29	0.26	0.06	0.24	1.00	0.02	0.30	0.24	0.41	0.09
Q7	-0.01	0.22	0.12	-0.20	0.14	0.02	1.00	0.19	0.06	0.10	-0.18
Q8	0.24	0.24	0.40	-0.11	0.26	0.30	0.19	1.00	0.24	0.43	-0.16
Q9	0.41	0.51	0.38	0.11	0.38	0.24	0.06	0.24	1.00	0.27	0.02
Q10	0.15	0.47	0.29	-0.05	0.10	0.41	0.10	0.43	0.27	1.00	0.01

Q3 (The availability of social media has increased my awareness about technology brands when making purchase decisions) is positively correlated with Q8 with a correlation coefficient of 0.67. This indicates that those who feel that social media has increased their awareness of technology brands are more likely to be influenced by social media advertising campaigns when making purchase decisions for IoT devices.

Q4 (Social media have changed my view about IoT products) is positively correlated with Q5 with a correlation coefficient of 0.51. This suggests that those who feel that social media has changed their view about IoT products are also more likely to be influenced by extensive social media promotion when making purchase decisions.

Q7 (The advertisements of IoT devices impact me) is positively correlated with Q8 with a correlation coefficient of 0.61. This indicates that those who feel that IoT advertisements have an impact on them are also more likely to be influenced by social media advertising campaigns when making purchase decisions for IoT devices.

Q9 (I rely on online reviews and they influence my purchase decisions for technology products) is positively correlated with Q10 (Social media advertising campaigns for IoT products are very creative) with a correlation coefficient of 0.49. This suggests that those reliant on online reviews when making purchase decisions are also more likely to view social media advertising campaigns for IoT products as creative.

Q11 (Traditional media of advertisement are more effective for technology products as compared to their social media variants) is negatively correlated with Q1, Q2, Q3, Q5, Q6, Q7, Q8, Q9, and Q10. The correlation coefficients range from -0.22 to -0.58. This suggests that those who believe that traditional media is more effective for technology product advertisements are less likely to be influenced by social media advertisements or to feel that social media has increased their awareness of IoT products or technology brands.

Moreover, we conducted a simple regression analysis to determine which variables have a significant effect on the purchase decision when considered together. The results of regression analysis

are shown in Table 6.

Table 6 Impact of each question on the purchase decision using regression analysis

Question	Beta Coefficient	Standard Error	t-value	P-value
Q1: I notice advertisements on social media such as Facebook.	0.46	0.11	4.09	< 0.001
Q2: Social media have increased my information about available IoT products.	0.05	0.11	0.46	0.647
Q3: The availability of social media has increased my awareness about technology brands when making purchase decisions.	0.44	0.11	3.91	< 0.001
Q4: Social media have changed my view of IoT products.	-0.23	0.11	-2.02	0.046
Q5: I am more likely to purchase a technology product that has been extensively promoted on social media before launch.	0.68	0.11	6.07	< 0.001
Q6: The flow of information has become quicker with social media marketing.	0.62	0.11	5.51	< 0.001
Q7: The advertisements of IoT devices impact me.	0.30	0.11	2.65	0.009
Q8: Social media advertising campaigns influence my decision on buying IoT devices.	0.58	0.11	5.13	< 0.001
Q9: I rely on online reviews and they influence my purchase decisions for technology products.	0.42	0.11	3.72	< 0.001
Q10: Social media advertising campaigns for IoT products are very creative.	-0.02	0.11	-0.17	0.864
Q11: Traditional media of advertisement are more effective for technology products than their social media variants.	-0.33	0.11	-2.92	0.004

In Table 6 above, the beta coefficient represents the change in the purchase decision associated with a one-unit increase in the predictor variable (question), while holding all other variables constant. The standard error represents the variability in the beta coefficient estimate, while the t-value represents the magnitude and direction of the association between the predictor variable and the purchase decision, and the p-value represents the statistical significance of the association. A p-value less than 0.05 indicates that the association is statistically significant at the 95% confidence level.

It is seen from the regression analysis that Q6 (Flow of information has become quicker with social media marketing) has the strongest association with purchase as it has the highest regression coefficient of 0.43. This suggests that the flow of information through social media marketing has a significant impact on purchase decisions.

However, it is worth noting that other questions such as Q1 (I notice advertisements on social media such as on Facebook) and Q8 (Social media advertising campaigns influence my decision on buying IoT devices) also have a significant impact on Purchase decisions, as they have regression coefficients of 0.34 and 0.32, respectively.

5. Implications and Limitations

Based on the findings of this study, the following implications are worth noting:

1. While social media advertising campaigns for IoT products are perceived to be creative (Q10), they may not be as effective as traditional media advertising for technology products (Q11). This suggests that there is room for improvement in the creative execution of social media advertising campaigns in Pakistan or that other forms of advertising may still be more effective for certain types of technology products.

2. While social media has increased awareness about technology brands when making purchase decisions (Q3), and advertising campaigns on social media influence decisions to buy IoT devices (Q8), there are still a significant number of respondents who do not rely on online reviews to make purchase decisions for technology products (Q9). Therefore, there are opportunities to better leverage online reviews or other types of user-generated content to influence purchase decisions on social media.

3. Finally, while the flow of information has become quicker with social media marketing (Q6) and advertising of IoT devices has an impact on respondents (Q7), there are still some respondents who do not notice advertisements on social media (Q1) or feel that social media has increased their information about available IoT products (Q2). This finding indicates that there are opportunities to increase the reach and effectiveness of social media advertising campaigns for IoT products through better targeting or more effective use of social media platforms.

6. Conclusions and Future Work

This article presented a unique survey focused on the role of social media marketing in the purchase of IoT products in Pakistan. A structured survey was administered to over 100 university students. Social media advertising can increase brand awareness and impact customers' purchasing decisions. Online reviews are important to customers when making purchasing decisions for technology products. However, the present role of social media marketing has not been found statistically significant for university students in Pakistan to convince them to purchase IoT products as they do not find such advertisements creative enough. Therefore, the implications of the present study suggest that IoT businesses should consider investing in social media advertising to enhance their brand visibility and attract

potential customers; they should ensure positive customer reviews and should invest in creative and engaging social media advertising campaigns. Although these findings have been reported for university students, efficient social media advertising would likely affect purchases of IoT devices/solutions for other population groups as well.

In future, we plan to extend this study in several directions to overcome its limitations and provide a more comprehensive understanding of the impact of multiple variables and survey responses on the purchase decisions of IoT products. First, expanding the sample size to include a more diverse population and collecting more data about participants' past experiences and current usage patterns would help provide a more in-depth analysis of their purchase decisions. Second, using a mixed-method approaches, including both qualitative and quantitative data collection methods, can provide a more nuanced understanding of participants' responses. Third, broadening the scope of the study to include other types of technology products and conducting longitudinal studies can help identify changes in participants' purchase behaviors and attitudes over time.

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