



The Role of Digital Marketing on Consumer behavior in Sudan: A Case Study by ZAIN Communication Company for the Period 2000–2022

*Shimaa Bakri Ahmed Salih^{*1}, Gosay Magoub Mohammed Salih Baba²*

¹M.A., scholar Alsharq Al-Ahlia College, Kassal State, Sudan, Email: Shimaabakri@outlook.com

²Dr. National Ribat University, Sudan, Email: Gosaybaba@gmail.com

ABSTRACT

The study aimed to examine the impact of digital marketing with macroeconomic factors on the purchase decisions of consumers by using a multilinear regression model test with OLS methodology to analysis The Role of Digital Marketing on Consumer Behavior in Sudan(case study ZAIN telecommunication Co) for the period 2015–2022. ,The outcome results indicate that indicators of mobile cellular subscriptions and individuals using the Internet directly, GDP per capita, and population had a positive effect, while indicators of fixed broadband subscriptions, fixed telephone subscriptions, and inflation rate had an adverse effect on the number of mobile subscribers. In addition, subscriber indexes recovered rapidly after the negative impact of South Sudan's independence due to increased global demand for telecommunications, specifically in developing countries such as Sudan. We recommended improving the quality of communication services while maintaining the expansion of rural reach with the same quality of services as urban areas. also improving the quality and speed of the Internet to harmonies with current requirements and the frequent use of applications in all aspects of life. Finally maintaining the stability of service prices against the risks of exchange rate fluctuations and inflation through an insurance fund.

Keywords: Digital marketing, consumer behaviour, telecommunication, inflation, social media

1. Introduction:

Over the past two decades, brands and businesses have changed because of digitalization. This strategy is becoming more and more popular and especially when it is gradually becoming a global trend. The American Marketing Association provides an overarching definition of digital marketing, encompassing most of the activities, organizations, and processes stimulated by digital technologies to communicate, create and bring value to customers (American Marketing Association, 2013).

Social media is a relatively recent phenomenon. Over the last decade, the World Wide Web has seen a proliferation of user-driven web technologies such as blogs, social networks and media sharing platforms. Collectively called social media, these technologies have enabled the growth of user-generated content, a global community, and the publishing of consumer opinions (Smith, 2009) Thus, we can predict that there are many pros related to the E-marketing (Tehrani, M. N., 2008) and some of the advantages are discussed as below:

1. It helps in gaining much better return on investment, than that of traditional marketing, as it helps in increasing sales revenue at minimum cost.
2. Talking about cost, E-marketing means reduced marketing campaign cost, as the marketing is done through the internet and only paid ads can be treated as cost for the firms, apart from the salary of digital media employees.
3. The most relevant benefit is the visible fast result of the campaigns as it helps to target the right customers.
4. Easy monitoring through the web tracking capabilities help make e-marketing highly efficient and effective tool to use in the present business scenario.
5. Using e-marketing and focus on right motive can help in the creation of viral contents which could easily help in viral marketing. This forms an effective strategy and is one of the most important tool for integrated marketing communication.

. Moving ahead with the cons of e-marketing (Taherdoost, H., & Jalaliyoon, N., 2014). They are described as follows: -

1. E-Marketing relies entirely on technology and the internet; a shortcut can put entire business at risk.
2. Presence of a global competition is both an opportunity, as well as, a threat.
3. Privacy and security issues are very high because data is available to everyone; therefore, one should be very careful about going online.
4. When privacy and security issues are high, then businesses have to spend a lot of money to be secure.

5. With the ever-changing technological environment, businesses have to constantly change at the speed of technology and maintenance costs can be high, with increase in the business size. Thus, we can say that even with the cons, e-marketing is a blessing in disguise because the benefits of advantages are out-marking the impact of the disadvantages. As per the study (Patel, J., & Malpani, A., 2020), the nations included in G7 and major world economies such as the United States of America, Japan, China, Germany, France, Britain and Italy are under the immense economical cost burdens, followed by the best developing nations, such as India. G7 countries are currently sharing 60% of the world's supply and demand (GDP), 65% of the world's manufacturing, and 41% of the world's manufacturing exports. Talking about developing nations, India is the biggest market for the businesses globally and their downturn has led to a significant impact on the global economy situation. (Eichengreen, B. (2020)).

has defined these as Coronanomics, but the solution came out in the form of e-marketing platform because business revivals could help in revival of the economy, as well. The live proof of this could be, how businesspersons have evolved through this pandemic, just because of e-marketing and how it has helped them to survive in the market that was very volatile in this 2020 coronavirus situation. E-marketing tools and modern day marketing strategies (Patel, J., & Malpani, A., 2020) have to be given credit for it because at the end in the market survival with profit, is the key to become the leader and for this deep understanding of consumer behaviour plays a vital role.

Social media plays a significant role in marketing. Here are some key aspects:

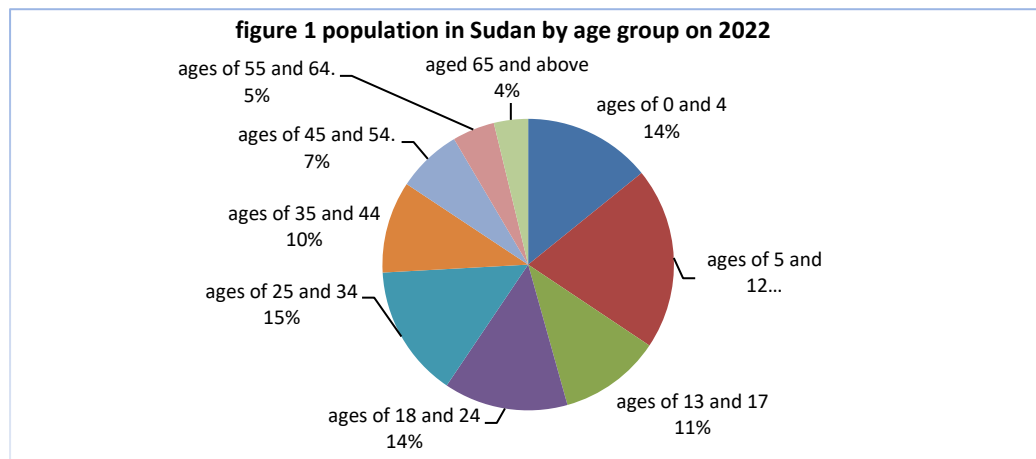
Increased Brand Awareness: Social media platforms allow businesses to reach a wider audience, increasing brand visibility and recognition.

- ✓ Targeted Advertising: Social media platforms provide tools to define specific target audiences based on demographics, interests, and behavior. This enables businesses to deliver tailored advertisements to the right people, improving the effectiveness of their marketing efforts.
- ✓ Engagement and Interaction: Social media allows businesses to engage directly with customers, providing a platform for conversations, feedback, and building relationships. This fosters customer loyalty and brand advocacy.
- ✓ Content Distribution: Social media platforms are an excellent vehicle for distributing and promoting content. Businesses can share blog posts, videos, info graphics, and other valuable materials to attract and educate their target audience.
- ✓ Customer Insights: Social media provides valuable insights into customers' preferences, opinions, and behavior. This data can help businesses understand their target audience better, refine marketing strategies, and develop products/services that meet customer needs.
- ✓ Competitive Advantage: By monitoring competitors' social media activities, businesses can gain insights into their strategies, identify industry trends, and stay ahead of the competition.
- ✓ Increased Website Traffic: Social media promotion drives traffic to business websites, expanding the potential for lead generation and conversions.
- ✓ Influencer Marketing: Social media platforms offer opportunities to collaborate with influencers who have large and engaged audiences. These influencers can help promote products/services and increase brand credibility and reach. social media has transformed marketing by providing businesses with powerful tools to connect with their target audience, build brand awareness, drive engagement, and achieve business objectives

Social media refers to digital platforms and technologies that enable users to create, share, and exchange content in real-time. It allows individuals and organizations to connect and interact with each other, build communities, and engage in online communication through various forms of content such as text, images, videos, and audio. Examples of popular social media platforms include Facebook, Instagram, Twitter, LinkedIn, and YouTube.

Consumer behavior in the context of social media focuses on how individuals behave and make purchase decisions in the digital space. It involves analyzing how consumers interact with brands, seek information, evaluate products or services, make purchase decisions, and engage in post-purchase activities on social media platforms. Understanding consumer behavior on social media is essential for businesses to develop effective marketing strategies and create meaningful and relevant experiences for their target audience.

Sudan's total population was 45.45 million in January 2022. Population increased by 1.1 million (+2.4%) between 2021 and 2022. 50% of Sudan's population is female, while 50% of the population is male. At the start of 2022, 36.0% of Sudan's population lived in urban centers, while 64.0% lived in rural areas.



Source: Global Digital Insights Data Report, Sudan 2022

From the previous figure (1) The median age between 13- 54 of the population in Sudan is above than 70.0. % of all population in Sudan that mean more than 31 million from total population 45 million, which is refer to huge numbers of possible user for mobile phones and ICT and internet.

Mobile connections in Sudan were 32.59 million cellular mobile connections in Sudan at the start of 2023. However, note that many people around the world make use of more than one mobile connection – for example, they might have one connection for personal use, and another one for work – so it's not unusual for mobile connection figures to significantly exceed figures for total population. So indicate that mobile connections in Sudan were equivalent to 68.6 % of the total population in January 2023. The number of mobile connections in Sudan decreased by 764 thousand (-2.3 percent) between 2022 and 2023.

Internet use in Sudan there was 14.03 million internet users in Sudan in January 2022, internet penetration rate stood at 30.9 % of the total population at the start of 2022. So analysis indicates that internet users in Sudan increased by 331 thousand (+2.4 %) between 2021 and 2022.

For perspective, these user figures reveal that 31.42 million people in Sudan did not use the internet at the start of 2022, meaning that 69.1% of the population remained offline at the beginning of the year. Internet connection speeds in Sudan indicate that internet users in Sudan could have expected the following internet connection speeds at the start of 2023 by Median mobile internet connection speed via cellular networks: 13.38 Mbps and Median fixed internet connection speed: 5.04 Mbps the median mobile internet connection speed in Sudan increased by 4.76 Mbps (+55.2 %) in the twelve months to the start of 2023. also fixed internet connection speeds in Sudan increased by 1.45 Mbps (+40.4 %) during the same period. (Global Digital Insights Data Report, Sudan: 2022).

1.1- Digital Market in Sudan:

The digital market in Sudan has been witnessing notable growth and development in recent years. Here are some key aspects of Sudan's digital market:

- **Internet Penetration:** Internet penetration in Sudan has been steadily increasing over the years. As of 2021, the internet penetration rate is estimated to be around 34%, indicating a significant potential for growth.
- **Mobile Connectivity:** Mobile devices play a crucial role in accessing the internet in Sudan. Mobile penetration is relatively high, with a large percentage of the population using smartphones to connect to the internet and engage in online activities.
- **Social Media Usage:** Social media platforms have gained popularity in Sudan, with Facebook being one of the leading platforms. Instagram has also seen increased usage, especially among the younger population. These platforms offer an opportunity for businesses to reach and engage with their target audience effectively.
- **E-Commerce Landscape:** E-commerce is gradually gaining traction in Sudan. Online shopping platforms are emerging, allowing consumers to purchase products and services conveniently. However, the e-commerce landscape is still developing, and there are opportunities for growth and improvement in terms of logistics, infrastructure, and consumer trust.
- **Mobile Money:** Mobile money services have gained significant momentum in Sudan. Platforms like Zain Cash, MTN Momo, and MyMazad provide convenient and secure ways for individuals to perform financial transactions, including money transfers and bill payments, using their mobile phones.
- **Digital Advertising:** Digital advertising is becoming increasingly popular in Sudan. Businesses are leveraging social media platforms and display advertising to reach their target audience online. Influencer marketing is also gaining traction, with influencers playing a role in promoting products and services.

- Regulatory Challenges: Sudan's digital market still faces some challenges, including regulatory frameworks and infrastructure limitations. However, the government has taken steps towards the development of digital policies and regulations to encourage growth and create a favorable environment for digital businesses.
- Start-up Ecosystem: Sudan's digital market has witnessed the emergence of a vibrant start-up ecosystem, with entrepreneurs focusing on various digital services and solutions. This ecosystem brings innovation and opportunities for collaboration and growth in the digital sector.

So Sudan's digital market is evolving, presenting opportunities for businesses to tap into a growing online population and leverage digital platforms for marketing, e-commerce, and communication purposes.

1.2- Social Media Marketing in Sudan:

Social media marketing in Sudan has become increasingly prevalent, given the growing popularity of social media platforms among the population. Here are some key points regarding social media marketing in Sudan:

- ✓ Platform Usage: Facebook is the leading social media platform in Sudan, with a significant number of active users. Instagram and Twitter also have a considerable user base, especially among the younger population. Understanding the demographics and preferences of each platform is crucial for effective social media marketing.
- ✓ Engaging Content: Creating engaging and localized content is essential when targeting Sudanese social media users. Content that reflects Sudanese culture, traditions, and values is likely to resonate well with the audience. Utilizing a mix of visuals, videos, and compelling storytelling can enhance engagement and reach.
- ✓ Influencer Marketing: Collaborating with local influencers can be an effective strategy to promote products and services in Sudan. Influencers have the ability to connect with their followers and offer authentic recommendations, increasing brand visibility and credibility.
- ✓ Localized Advertising: Tailoring advertisements to the Sudanese audience is vital. Using localized language, visuals, and culturally-relevant references in advertising campaigns can help establish a deeper connection with the target market.
- ✓ Engagement and Interaction: Actively engaging with social media users in Sudan is crucial to building brand loyalty and fostering positive relationships. Responding to customer inquiries, addressing concerns, and initiating conversations with followers can create a sense of trust and loyalty among the audience.
- ✓ Utilizing Hashtags: Utilizing relevant hashtags specific to Sudan can help increase the visibility of social media content. Researching popular and trending hashtags in Sudan can ensure that content reaches the right audience and generates higher engagement.
- ✓ Social Causes and CSR: Aligning social media marketing efforts with local causes and corporate social responsibility initiatives can resonate well with the Sudanese audience. Demonstrating a commitment to the community and addressing social issues can enhance brand reputation and credibility.
- ✓ Continuous Monitoring and Analytics: Monitoring social media metrics and analytics is essential for measuring the effectiveness of social media marketing campaigns. Tracking metrics like engagement rate, reach, and click-through rates can provide insights and inform future strategies.

It's important to note that cultural sensitivity and respecting local customs and traditions are crucial while implementing social media marketing strategies in Sudan. Understanding the unique characteristics and preferences of the Sudanese audience is vital for successful social media marketing in the country.

Telecommunications in Sudan:

The telecommunications sector is an important economic resource. It has witnessed developments and achievements that led to the establishment of an infrastructure based on state-of-the-art technologies based on a national fiber-optic network that has extended to most of Sudan. The National Telecommunications Authority is the governmental body that organized and regulated 174 telecommunications service in Sudan, where the telecommunications sector was reorganized and the National Telecommunications Council Act of 1994 was amended in 1996; which established the regulatory authority for the telecommunications sector to monitor and regulate the work in the telecommunications sector. In order to keep pace with the latest developments in telecommunications technology worldwide, the Telecommunications Law of 2001 was passed to convert the National Telecommunications Council to the National Telecommunications Authority, headquartered in Khartoum. The Authority supervises all mobile, fixed telephone and internet services

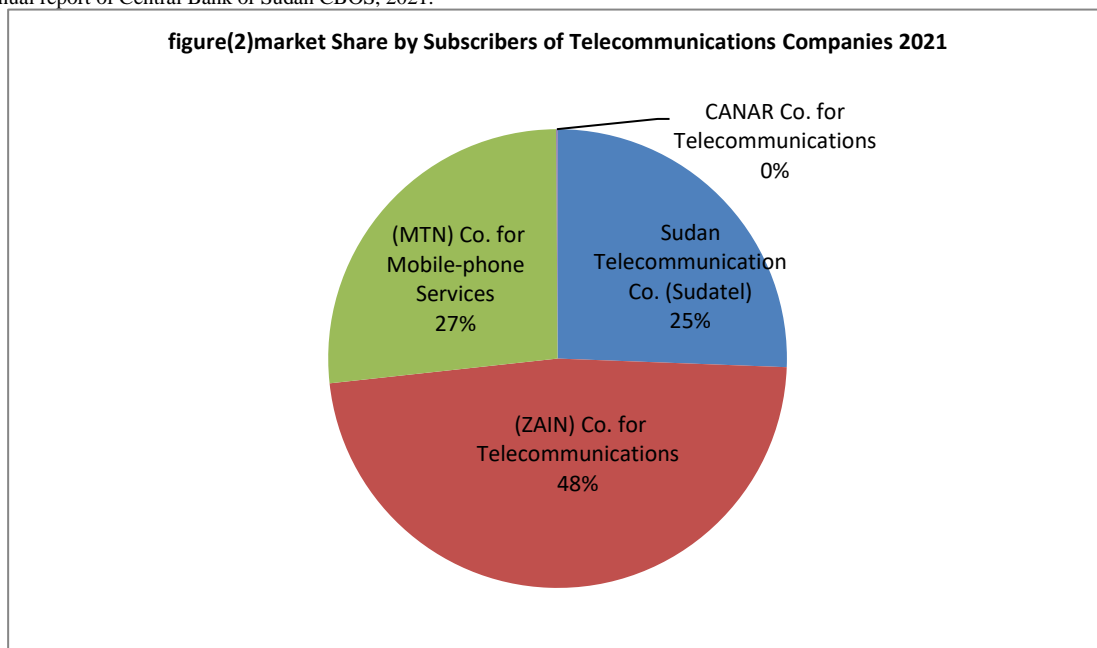
Zain Telecom Company : The first mobile phone company was established by Sudanese mobile phone company (Mobitel) in 1997 and operates with GSM technology, and started commercially in the same year. In 2006, Mobitel was purchased from Sudatel and its brand name was changed to Zain.

Bulleted lists may be included and should look like this:

Table (1) market Share by Subscribers of Telecommunications Companies 2021

Company	1,000 Subscribers	net share of market
Sudan Telecommunication Co. (Sudatel)	8,872	25.6%
Thabit Co.	126	0.4%
Sudani Co. for Telecommunications	8,746	25.2%
(ZAIN) Co. for Telecommunications	16,522	47.7%
(MTN) Co. for Mobile-phone Services	9,229	26.6%
CANAR Co. for Telecommunications	32	0.1%
total	34,655	
Company	1,000 Subscribers	net share of market

Source: annual report of Central Bank of Sudan CBOS, 2021.



Source: annual report of Central Bank of Sudan CBOS, 2021.

From table and figure (1) The Sudanese Telecommunications Company (Sudatel) includes both Thabit Telecom and Sudani Telecom, with 8,872 thousand subscribers in 2021 represent to 25% from market Share by Subscribers of Telecommunications Companies. also Zain with 16,522 thousand subscribers in 2021 represent to 48% from market Share by Subscribers of Telecommunications Companies. and MTN with 9,229 thousand subscribers in 2021 represent to 27% from market Share by Subscribers of Telecommunications Companies. finally Canar with 32 thousand subscribers in 2021 represent to 0% from market Share by Subscribers of Telecommunications Companies.

1.3- Study framework:

OBJECTIVES: The various objectives of our research study are described below:

- ◆ To find out the understand the and identify the concepts with relationship between digital marketing practices , macroeconomic factors on consumer behavior.
- ◆ To examine the impact of digital marketing with macroeconomic factors on purchase decision of consumers

The Problem: The competitiveness imposed by globalization and international trade requires continuous improvement and measurement of the interaction digital marketing and consumer's behaviors specially the effect of digital marketing with macroeconomic factors. Because the maximizing their effect on consumer clearly and despite of the theirs is lake of research study this issue especially on Sudan.

Hypotheses:

- 1- there is relationship between digital marketing factors and macroeconomic factors with consumers behaviors
- 2- the digital marketing factors had positively effects on consumers behaviors

3- the macroeconomic factors with consumers behaviors had positively effects on consumers behaviors

Methodology and Data Collections:

The focus of this research is on Analysis OLS model Multiple regression model to measure the perception of consumers behaviors regarding application of the methods of digital marketing in the company's operation ZAIN communication company on Sudan from 2000-2022 Data and Justification of Selection of Cases Studies Research uses the descriptive, comparative and quantitative methods of analysis and use a combination of the most suitable primary (qualitative) and secondary (quantitative) Data. The Secondary data was used for the quantitative analysis and obtained from local Institutions (e.g. World Bank data, governmental institutions and companies reports..., Etc.).

3- Empirical analysis:

As multi liner regression model test by OLS methodology to analysis The Role of Digital Marketing on Consumer Behavior in Sudan (case study ZAIN telecommunication co) on period (2015-2022)

$$ZNS = f(\text{INF}, \text{POP}, \text{GDPC}, \text{IUI}, \text{FTS}, \text{FBS}, \text{MS})$$

$$ZNS = (B1)C + (B2) \text{POP} + (B3) \text{GDPC} + (B4) \text{INF} + (B5) \text{IUI} - (B6) \text{FTS} - (B7) \text{FBS} + (B8) \text{MS} + U$$

3.1- Description of Variables:

Dependence variable Consumer Behavior (ZAIN costumers subscription): This variable represents the dependent variable in the economic model, reflecting the actions, decisions, and activities of consumers in Sudan regarding the purchase and use of goods and services. in our paper as case study of ZAIN Company can represent by annually ZAIN costumers subscription.

The independence variables:

- Inflation rate : measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.

- GDP per capita (current US\$): GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.

- Total Population: based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates.

- Mobile cellular subscriptions – Sudan: subscriptions to a public mobile telephone service that provide access to the PSTN using cellular technology. The indicator includes (and is split into) the number of postpaid subscriptions, and the number of active prepaid accounts (i.e. that have been used during the last three months). The indicator applies to all mobile cellular subscriptions that offer voice communications. It excludes subscriptions via data cards or USB modems, subscriptions to public mobile data services, private trunked mobile radio, telepoint, radio paging and telemetry services.

- Individuals using the Internet (% of population): Sudan Internet users are individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.

- Fixed telephone subscriptions – Sudan: refers to the sum of active number of analogue fixed telephone lines, voice-over-IP (VoIP) subscriptions, fixed wireless local loop (WLL) subscriptions, ISDN voice-channel equivalents and fixed public payphones.

- Fixed broadband subscriptions: refers to fixed subscriptions to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This includes cable modem, DSL, fiber-to-the-home/building, other fixed (wired)-broadband subscriptions, satellite broadband and terrestrial fixed wireless broadband. This total is measured irrespective of the method of payment. It excludes subscriptions that have access to data communications (including the Internet) via mobile-cellular networks. It should include fixed WiMAX and any other fixed wireless technologies. It includes both residential subscriptions and subscriptions for organizations. (World Bank national accounts data:2022)

- C = constant variable

2. REVIEW OF LITERATURE

Dani, N. J. (2017): This paper talked about consumer's attitude towards online shopping and the factors associated with it. The study was conducted in Kanyakumari and 100 was allotted sample size. This paper talked about security features as a major concern among consumers and derived its solutions from those researches. Research work's limitation was its time & budge

Kumar, N., Francis, D. & Ambily, A. S. (2017): This paper has been designed to examine the key consumer behavior and their relationship with each other in the e-marketing perspective. The entire research study was conducted in the Ernakulam district. The study had a sample size of 200 and it gives the direction to improve the delivery and advertising web-products & services process to achieve the objective of E-marketing and E-commerce in the long run process.

Kumar, M. & Shanthi, S. (2016): This research study focuses on the understanding of the consumer behavior about online marketing in Mysore, Karnataka. The increasing usage of the Internet in India provides a developing prospect for the online shopping module. This paper had suggested that if the online marketers are pre-aware about the factors that could influence the behavior of customers towards online marketing and the existing relationships between them, then they can further develop their affective tailor made marketing strategies to convert potential customers into the active ones. This research also high lights the role of demographic factors like Age, Gender, Income, Marital status affecting the Consumer behavior towards online marketing. Swadia, B.U. (2018): The paper highlights that acceptance rate of e-marketing among the Jaipur consumers and its impact on their purchase decision. Research result depicts that people irrespective of age and gender, surf the internet. However, significant differences exist between the age and attributes of online trading, but it does not have any relation with the gender.

Rudresha, C. E., Manjunatha, H. R. & Chandrashekarappa, U. (2018): The sample size was 100 and random sampling methods have been adopted to collect the data. The study suggested that most of the people don't shop online due to fear of quality of goods, afraid to give out their card details and also, they find out that the conventional methods are more enjoyable. But it also suggests the fact that large number of people is getting attracted towards online shopping creates a basis for tremendous prospects for marketers of today and tomorrow. The study concluded on a note that online shopping will take over as the prime marketing and selling channel in India in near future

(Straw, 2011) According to Straw (2011) "The perceptions by companies match the changing ways in which consumers find information about the products and services they want to buy." Small firms are generally at an advantage because their small size makes it easier to get close to customers and obtain valuable feedback

(Gilmore et al., 1999). Such an advantage enables small businesses to take advantages of the marketing opportunities networking and word of mouth marketing provide. But small business owners face many challenges when it comes to marketing as well. Numerous marketing opportunities exist for small businesses, namely networking and word of mouth marketing. Not only do owner-managers of small businesses rely on their personal contact network, but they rely on the networks of their customers as well. Small businesses often rely on word of mouth recommendations for new customers. Word of mouth marketing provides small businesses with an opportunity to give customers a reason to talk about products, making it easier for word of mouth to take place. Networking is a widely cited marketing activity for SMEs and is important during their establishment, development, and growth

(Walsh & Lipinski, 2009). Siu (as cited in Walsh & Lipinski, 2009) found that in marketing their firms, SMEs rely heavily on their personal contact network. Traditionally, economic structures favour larger firms; however, today's economy is distinguished by relationships, network, and information, favouring some of the characteristics of SMEs

(Walsh & Lipinski, 2009; Adegbuyi, 2009). Rather than relying solely on their personal contact network, small businesses rely on the networks of customers as well. Today, these customers can be reached through electronic word of mouth, or eWOM

Social Media Marketing Social media has caused a significant change in the strategies and tools companies use for communicating with customers.

Mangold & Faulds (2009) argue that "social media combines characteristics of traditional IMC tools (companies talking to customers) with a highly magnified form of word-of-mouth (customers talking to one another) whereby marketing managers cannot control the content and frequency of such information." Companies are limited in the amount of control they have over the content and distribution of information. Ignoring such user-generated content is not an option. Companies must be able to monitor and respond to conversation, both positive and negative, surrounding the brand. There are ways however, that companies can influence discussions in a way that is consistent with the organization's mission Social media marketing enables companies to achieve a better understanding of customer needs in order to build effective relationships.

Safko & Brake (2009) observe that social media "refers to activities, practices, and behaviors among communities of people who gather online to share information, knowledge, and opinions using conversational media refers to social media as "online applications, platforms and media which aim to facilitate interaction, collaboration, and the sharing of content". With a definition of social media in place, accurately defining social media marketing is possible. A basic definition is "using social media channels to promote your company and its products

Weinberg (2009) notes that social media "relates to the sharing of information, experiences, and perspectives throughout community-oriented websites".

Comm (2009) says that social media is "content that has been created by its audience".

(Barefoot & Szabo, 2010) An expanded definition is "a process that empowers individuals to promote their websites, products, or services through online social channels and to communicate with and tap into a much larger community that may not have been available via traditional advertising channels..

3. Empirical analysis :

As multi liner regression model test by OLS methodology to analysis The Role of Digital Marketing on Consumer Behavior in Sudan (case study ZAIN telecommunication co) on period (2015-2022)

$$ZNS = f (INF, POP, GDPC, IUI, FTS, FBS, MS)$$

$$ZNS = (B1)C + (B2) POP + (B3) GDPC + (B4) INF + (B5) IUI - (B6) FTS - (B7) FBS + (B8) MS + U$$

3.1- Description of Variables:

Dependence variable Consumer Behavior (ZAIN costumers subscription): This variable represents the dependent variable in the economic model, reflecting the actions, decisions, and activities of consumers in Sudan regarding the purchase and use of goods and services. In our paper as a case study of ZAIN Company can be represented by annually ZAIN costumers subscription.

The independence variables:

- Inflation rate : measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.
- GDP per capita (current US\$): GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.
- Total Population: based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates.
- Mobile cellular subscriptions – Sudan: subscriptions to a public mobile telephone service that provide access to the PSTN using cellular technology. The indicator includes (and is split into) the number of postpaid subscriptions, and the number of active prepaid accounts (i.e. that have been used during the last three months). The indicator applies to all mobile cellular subscriptions that offer voice communications. It excludes subscriptions via data cards or USB modems, subscriptions to public mobile data services, private trunked mobile radio, telepoint, radio paging and telemetry services.
- Individuals using the Internet (% of population): Sudan Internet users are individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.
- Fixed telephone subscriptions – Sudan: refers to the sum of active number of analogue fixed telephone lines, voice-over-IP (VoIP) subscriptions, fixed wireless local loop (WLL) subscriptions, ISDN voice-channel equivalents and fixed public payphones.
- Fixed broadband subscriptions: refers to fixed subscriptions to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This includes cable modem, DSL, fiber-to-the-home/building, other fixed (wired)-broadband subscriptions, satellite broadband and terrestrial fixed wireless broadband. This total is measured irrespective of the method of payment. It excludes subscriptions that have access to data communications (including the Internet) via mobile-cellular networks. It should include fixed WiMAX and any other fixed wireless technologies. It includes both residential subscriptions and subscriptions for organizations. (World Bank national accounts data:2022)
- C = constant variable

Table (2) dependence & independence variables data on Sudan for period 2000-2022

Years	ZNS	MS	FBS	FTS	IUI	INF	GDPC	POP,
2000	91,000.0	23000		386775	0.025785	7.121259	378.1575	26298773
2001	91,117.0	103846		448000	0.140185	1.935296	471.3728	26947253
2002	265,520.0	190778		671842	0.439478	22.22472	529.4519	27570318
2003	554,072.0	527233		936756	0.538472	6.489432	607.0062	28188977
2004	1,048,558.0	1048558	793	1028899	0.791562	9.657546	737.1228	28831550
2005	1,596,154.0	1827940	1269	570000	1.292041	8.505851	945.6896	29540577
2006	2,464,430.0	4683127	2065	499000		7.19913	1179.898	30332968
2007	3,877,474.0	8218092	42500	345194	8.66	14.75428	1500.673	31191163
2008	5,190,278.0	11991469	44625	366200		14.29712	1585.583	32065241
2009	8,492,657.0	15339895		370423		11.25676	1382.621	32948155
2010	10,250,000.0	18093231	13500	544984		12.97767	1706.415	33739933
2011	12,995,000.0	25056185	17430	483617		18.09662	1982.817	34419624
2012	12,557,000.0	27658595	24789	424586		35.55906	1797.401	35159792
2013	11,731,000.0	27657875	25707	415571		36.52234	1834.561	35990704
2014	11,123,000.0	27796611	20661	415106		36.90664	2076.001	37003245

2015	11,909,000.0	27938507	28093	118954		16.90957	2226.409	38171178
2016	12,588,000.0	27807293	26376	136472	14.1	17.75025	2614.294	39377169
2017	13,572,000.0	28644139	30549	143280	18.6	32.35163	3188.769	40679828
2018	14,650,000.0	30100412	31352	136923	24.6	63.29251	769.8691	41999059
2019	15,981,000.0	33014160	32762	137842	25.9	50.99405	748.0109	43232093
2020	16,090,000.0	35195207	28782	129408	28.4	163.2578	608.3325	44440486
2021	16,552,000.0	34496300	30426	131485		359.093	749.7068	45657202
2022	17,340,000.0	34671259	29847	155802		138.8085	1102.146	46874204

Source: World Bank database, and OECD data files.

It is noted from the previous table that all indicators decreased to a large extent after the year 2010, that is, during the year 2011 and 2012, and this is due to the independence of South Sudan and the consequent separation of telecommunications companies in the south, and Zain was divided into Zain North Sudan and another company Zain in South Sudan.

3.2- analysis:

3.2.1- correlation test :

Table (3) correlation between dependence & independence variables data on Sudan for period 2000-2022

	ZNS	MS	FBS	FTS	IUI	INF	GDPPEC	POP
ZNS	1.0000							
MS	0.9981	1.0000						
FBS	0.6200	0.6340	1.0000					
FTS	-0.8603	-0.8676	-0.7926	1.0000				
IUI	0.9631	0.9583	0.6712	-0.8272	1.0000			
INF	-0.6443	0.6544	0.3095	-0.4664	0.7584	1.0000		
GDPC	0.1549	0.1784	0.2696	-0.3294	-0.0450	-0.3585	1.0000	
POP	0.997	0.9951	0.5950	-0.8449	0.9729	0.6968	0.103	1.0000

Source: prepared by author from STATA analysis program output result.

From previous table Propositions of the parameters: In this step, theoretical predictions of the signal and size of the parameters of the model are specified Based on what is provided by economic theory or previous sources of information. According to the standard models proposed in the This study predicts the prior sign by the nature of the relationship between the dependent variables (ZNS) & independent variables (INF,POP,GDPC,IUI, FTS, FBS, MS)as the result of correlation tablet follows: -

- INF coefficient reference In relation to ZNS is expected to be a positive sign due to the existence of a relationship between the GDP and Access to ZNS because there is positive correlation with them.

- POP coefficient reference In relation to ZNS is expected to be a positive sign due to the existence of a relationship between the POP and Access to ZNS because there is positive correlation with them.

- GDPC coefficient reference In relation to ZNS is expected to be a positive sign due to the existence of a relationship between the GDPC and Access to ZNS because there is positive correlation with them.

- IUI coefficient reference In relation to ZNS is expected to be a positive sign due to the existence of a relationship between the IUI and Access to ZNS because there is positive correlation with them.

- FTS coefficient reference In relation to ZNS is expected to be a Negative sign due to the existence of a relationship between the FTS and Access to ZNS because there is Negative correlation with them.

- FBS coefficient reference In relation to ZNS is expected to be a positive sign due to the existence of a relationship between the FBS and Access to ZNS because there is positive correlation with them.

- MS coefficient reference In relation to ZNS is expected to be a positive sign due to the existence of a relationship between the MS and Access to ZNS because there is positive correlation with them.

3.2.2- Regression test:

As multi liner regression model test by OLS methodology to analysis The Role of Digital Marketing on Consumer Behavior in Sudan (case study ZAIN telecommunication co) on period (2015-2022) also by using Suppress constant term.

$$ZNS = f (INF, POP, GDPC, IUI, FTS, FBS, MS)$$

$$ZNS = (B1) C + (B2) POP + (B3) GDPC + (B4) INF + (B5) IUI - (B6) FTS - (B7) FBS + (B8) MS + U$$

Table (4) Regression results between dependence & independence variables data on Sudan for period 2000-2022:

		Coefficient value	T value	Probability value	F	F- Probability value	R2
Dependent variable	ZNS				999.00	0.001	0.98
Independent variables	POP	.031	10.27	0.052			
	INF	-110.9	-27.91	0.023			
	GDPC	129.30	4.91	0.018			
	IUI	2026.5	22.28	0.029			
	FTS	-.313	-3.30	0.058			
	FBS	-36.18	-21.57	0.029			
	MS	.3359	54.71	0.012			
	C	Suppress constant term			no constant		

Source: prepared by author from STATA analysis program output result.

First: Economic Estimates: Suppress constant term

- The criterion of economic theory: The (POP) coefficient is (0.03) is appositive sign representing the value of the dependent variable (ZNS) is positive and this result indicates that there is an absolute correlation between the changes POP and ZNS, according with economic theory.

- The criterion of economic theory: The (INF) coefficient is (-110.9) is Negative sign representing the value of the dependent variable (ZNS) is Negative and this result indicates that there is an absolute correlation between the changes INF and ZNS, according with economic theory.

- The criterion of economic theory: The (GDPC) coefficient is (129.30) is appositive sign representing the value of the dependent variable (ZNS) is positive and this result indicates that there is an absolute correlation between the changes GDPC and ZNS, according with economic theory.

- The criterion of economic theory: The (IUI) coefficient is (2026.5) is appositive sign representing the value of the dependent variable (ZNS) is positive and this result indicates that there is an absolute correlation between the changes IUI and ZNS, according with economic theory.

- The criterion of economic theory: The (FTS) coefficient is (-0.313) is Negative sign representing the value of the dependent variable (ZNS) is Negative and this result indicates that there is an absolute correlation between the changes FTS and ZNS, according with economic theory.

- The criterion of economic theory: The (FBS) coefficient is (-36.18) is appositive sign representing the value of the dependent variable (ZNS) is positive and this result indicates that there is an absolute correlation between the changes FBS and ZNS, according with economic theory.

- The criterion of economic theory: The (MS) coefficient is (0.335) is appositive sign representing the value of the dependent variable (ZNS) is positive and this result indicates that there is an absolute correlation between the changes MS and ZNS, according with economic theory.

Second: Statistical Estimates: T-test used to test the significance of the estimated parameters to determine the effect of the independent variables on the dependent variable. If The probability value is measured (test for the estimated parameter with 5% if the probability is bigger than 0.05) The Zero Hypothesis is accepted and therefore the parameter is statistically insignificant , but if the probability value is less than 0.05, well rejected the Zero Hypothesis and accepted the alternative hypothesis, the result is a statistically significant relationship between the independent variable and the dependent variable results estimate as follows:

(A) Clarity non-significance of the constant POP is evident from the table, which shows that the probability value of the POP coefficient (P.Value) is 0.05 less than the significance level of 5%.

(B). The significance of the coefficient of INF is evident from the table, which shows that the probability value of the INF coefficient (P.Value) is 0.02 less than the significance level of 5%. This result indicates a relationship with statistical significance between the INF and ZNS in ZAIN co on Sudan.

(C) The significance of the coefficient of GDPC is evident from the table, which shows that the probability value of the GDPC coefficient (P.Value) is 0.01 less than the significance level of 5%. This result indicates a relationship with statistical significance between the ZNS and GDPC in ZAIN co on Sudan.

(D) The significance of the coefficient of IUI is evident from the table, which shows that the probability value of the IUI coefficient (P.Value) is 0.02 less than the significance level of 5%. This result indicates a relationship with statistical significance between the ZNS and IUI in ZAIN co on Sudan.

(E) The significance of the coefficient of FTS is evident from the table, which shows that the probability value of the FTS coefficient (P.Value) is 0.05 less than the significance level of 5%. This result indicates a relationship with statistical significance between the ZNS and FTS in ZAIN co on Sudan.

(F) The significance of the coefficient of FBS is evident from the table, which shows that the probability value of the FBS coefficient (P.Value) is 0.02 less than the significance level of 5%. This result indicates a relationship with statistical significance between the ZNS and FBS in ZAIN co on Sudan.

(G) The significance of the coefficient of MS is evident from the table, which shows that the probability value of the MS coefficient (P.Value) is 0.01 less than the significance level of 5%. This result indicates a relationship with statistical significance between the ZNS and MS in ZAIN co on Sudan.

(F)Significance of a complete model determined by the value of F, where the probability value (Prob = 0.001) is less than the significance level (5%).

Third: Model Match Quality Test: The interpretation of the model or the model's ability to interpret is defined as R2, and the interpretation is stronger when it is closer to number (1) in the model. From the estimation results table, R2 shows that about (98%) of the changes in ZNS were explained by changes in (INF,POP,GDPC,IUI, FTS, FBS, MS), also (2%) of the changes are due to the variables not included in the model. This indicates the good quality of the model.

The impact of the digital marketing represented as independence variables(ZAIN(Number of Subscribers) -Mobile cellular subscriptions Fixed broadband subscriptions- Fixed telephone subscriptions- Individuals using the Internet (% of population)- Inflation, consumer prices (annual %) -GDP per capita (current US\$) - Population, total) on the dependent verbal consumer behavior represented as (ZAIN Number of Subscribers) in Sudan for period 2015-2022, therefore can express the relationship to mathematical function as follow:

$$- ZNS = (0)C + (.031) POP + (129.30) GDPC - (110.9) INF + (2026.5) IUI - (0.313) FTS - (36.18) FBS + (0.33) MS + U$$

4. Conclusion:

Study aimed to identify the concepts with relationship between digital marketing practices , macroeconomic factors on consumer behavior ,also examine the impact of digital marketing with macroeconomic factors on purchase decision of consumers by using multi liner regression model test by OLS methodology to analysis The Role of Digital Marketing on Consumer Behavior in Sudan(case study ZAIN telecommunication co)on period (2015-2022), The outcome results, it is clear that the indicators of Mobile cellular subscriptions and the Individuals using the Internet (% of population) had directly positive affect the number of number of subscribers of Zain Mobile Phone co, while the indicators of fixed broadband subscriptions with fixed telephone subscriptions had adversely affect the number of subscribers of Zain Mobile Phone co. It is also clear that the main macroeconomic indicators such as the GDP per capita and Population index affect directly to some extent, while the inflation rate index adversely affects the number of subscribers of Zain Mobile Phone co. In addition independence of South Sudan had a negative impact on Zain, but the speed of increase in global telecommunication demand, specifically in developing countries such as Sudan, led to the rapid recovered the situation and the restoration of the number of subscribers

Results & Recommendations:

Results:

1. indicators of Mobile cellular subscriptions and the Individuals using the Internet (% of population) directly had positive affect while the indicators of Fixed broadband subscriptions with Fixed telephone subscriptions had adversely effect on the number of number of subscribers of Zain Mobile Phone co,
2. GDP per capita and Population index had positive affect directly to some extent, while the inflation rate index adversely affects.
3. The subscriber index recovered rapidly after the negative impact of South Sudan's independence due to increased global demand for telecommunications, specifically in developing countries such as Sudan.

Recommendations:

1. Improve the quality of communication service while maintaining the expansion of rural reach with the same quality of services as urban areas
2. Improving the quality and speed of the Internet to harmonize with current requirements and the frequent use of applications steadily in all aspects of life.

References

1. American Marketing Association. (2013). Definitions of marketing. 2013. URL: [https://www.ama.org/the-definition-of-marketing-what-is-marketing/\(2020-02-24\)](https://www.ama.org/the-definition-of-marketing-what-is-marketing/(2020-02-24)).
2. Barefoot P and Szabo MT (2010) Brand new ventures? Insights on start-ups' branding practices. *Journal of Product & Brand Management* 19(5): 356- 366.
3. Comm J (2009) *Twitter power: How to Dominate your Market on tweet at a time* Hoboken. NJ: John Wiley & Sons.
4. Dani, N. J. (2017). A Study on Consumers' Attitude Towards Online Shopping. *International Journal of Research in Management & Business Studies*, 4(3), 42-46
5. Eichengreen, B. (2020). Coronavirus Pandemic: Europe Is Once Again Forged in a Crisis. *Intereconomics*, 55, 199-200.
6. Global Digital Insights Data Report, Sudan 2022. <https://datareportal.com/reports/digital-2023-sudan-1-10-2023>
7. Gilmore A, Carson D, Donnell AO and Cummins D (1999) Added value: A qualitative Assessment of SME Marketing. *Irish Marketing Review* 12(1): 27.
8. Mangold WG and Faulds DJ (2009) Social media: The New Hybrid Element of the Promotion Mix. *Business Horizons* 52(4): 357-365
9. Mohan Kumar, T. P., & Shiva Shanthi, S. (2016). Consumer behavior towards online marketing. *International Journal of Applied Research*, 2(5), 859-863.
10. Patel, J., & Malpani, A. (2020). Impact of Covid19 on e-marketing: An Early Stage Review. *International Journal of Advanced Science and Technology*, Vol. 29, 12s(2020).
11. Rudresha C.E, H.R. Manjunatha, Chandrashekarappa, U. (2018). Consumer's perception towards online shopping. *International Journal of Scientific Development and Research*, 3(11), 147-153.
12. Safko L and Brake DK (2009) *The Social Media Bible: Tactics, Tools & Strategies for Business Success*. NJ: John Wiley & Sons, Hoboken.
13. Smith, T. (2009) 'The social media revolution', *International Journal of Market Research*, Vol. 51, No. 4, pp.559-561
14. Straw J (2011) Word of Mouth Tops Survey of SME Marketing. Retrieved 10th Oct. 2014 from <http://www.marketingdonut.co.uk/blog/2011/05/wordmouth-tops-surveysme>
15. Swadia, B. U. Consumer behaviour towards e-marketing: a study of jaipur consumers
16. Walsh M and Lipinski J (2009) The role of the Marketing Function in Small and Medium sized Enterprises. *Journal of Small Business and Enterprise Development* 16(4): 569- 585
17. Taherdoost, H., & Jalaliyoon, N. (2014). Marketing vs E-marketing. *International Journal of Academic Research in Management*, 3(4), 335-340.
18. Tehrani, M. N. (2008). Achieving superior results from the mature market through e-marketing planning. ProQuest.
19. Weinberg T (2009) *The New Community Rules: Marketing on The Social Web* Sebastopol, CA: O'Reilly Media, Inc.
20. Source: World Bank database, and OECD data.
21. 21- Source: (1) United Nations Population Division. *World Population Prospects: 2022 Revision*. (2) Census reports and other statistical publications from national statistical offices, (3) Eurostat: *Demographic Statistics*, (4) United Nations Statistical Division. *Population and Vital Statistics Report* (various years), (5) U.S. Census Bureau: *International Database*, and (6) Secretariat of the Pacific Community: *Statistics and Demography Programme*