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NEW DIGITAL MARKETING DIMENSION THROUGH THE INTERNET OF THINGS

Abstract: Internet of Things (IoT), as an ecosystem of a variety of smart devices that enable data exchange over the Internet, provides a dynamic transformation of all industries and businesses, especially in information-related sectors, such as digital marketing. It is expected that by 2020, there will be over 50 billion IoT devices in homes and enterprises around the globe. Through the IoT enormous amount of data has been collected, allowing the establishment of new digital media strategies, and influencing marketers to incorporate the changes that technology brings to the digital marketing industry. With the increase in the number of IoT devices, marketers will be able to monitor and analyze consumer behavior, react to them almost immediately and, in accordance with this, better predict the behavior of consumers. The development of IoT and new data mining technologies facilitate the process of data collection, avoiding complicated market analysis processes. In addition, individual communication with each consumer is now enabled and thanks to these benefits, IoT becomes key support to marketers in meeting customer needs and requirements. It is anticipated that greater use of IoT devices will affect all segments of digital marketing, such as content marketing, the establishment of a digital promotional budget, and search strategies among others, but will also affect the form of advertising in the future. The appliance of IoT vision will make the organization more productive and efficient, by improving its products and services to provide a higher level of customer satisfaction. Nevertheless, in order to take advantage of the IoT benefits, organizations must redesign their existing business processes.
Keywords: Digital marketing; Internet of Things; Big Data

1. INTRODUCTION

The development of novel Information and Communication Technologies (ICT) contributes significantly to enhancing our daily lives and driving our economy. The Internet of Things (IoT) is a fast-growing technology that becomes pervasive and ubiquitous. It has been present in numerous application domains and with the help of an increasing number of diverse smart things/devices leads to immense improvements. The improvements are based on the data collected via IoT. According to Cisco (Evans, 2011), by 2020 there will be over 50 billion IoT devices that will produce enormous amounts of a variety of data. These data are mainly used for certain analysis and decision making that is of immense importance. However, managing the massive quantity of fast-generated and heterogenous IoT data, its collection, analysis, interpretation, extraction of knowledge and sharing is a quite challenging task for a data analyst.

This is the point where Big data comes in. IoT and Big data together enable the appropriate data analysis and knowledge extraction.

Marketing domain didn't remain immune to IoT development and inclusion. Instead, it has been also revolutionized and with novel ICTs traditional marketing has evolved towards digital marketing (Durmaz & Halil, 2016). IoT has enabled real-time data gathering. Having the right data in the right time, and adequately processed data play a significant role in changing the company-customer relationship. Instead of delayed communication, limited audience and global marketing that are features of traditional marketing, digital marketing nowadays is established on immediate communication, reaching the maximum of potential consumers accompanied with the targeted or client-specific marketing. Access to data and obtained knowledge help companies to better understand customers' needs, serve them more efficiently, increase customers satisfaction, hence taking the advantage over competitors. On the other side, customers become able to bring more appropriate decisions, getting better products at lower costs (Sniderman & Raynor, 2015).

Hence, this paper tries to help in understanding the symbiotic relationship between novel ICTs and marketing domain, through the analysis of IoT and Big data roles and their contributions in creating new digital marketing dimension. In that purpose, a systematic search of relevant literature was conducted on the following online databases: EBSCO, Scopus and Science Direct. Google Scholar and Research Gate were also used as appropriate subject-related information sources as well as the most recent comments and blogs from websites of a variety of institutions devoted to digital marketing research. However, the information sources used in this survey are by no means exhaustive and they have been used for illustrating, as much as possible, the current state of the application of IoT and Big data in the marketing domain. As the review is aimed at analyzing the roles and benefits technology advancements bring in digital marketing, a combination of quantitative and qualitative research methodologies was implemented. The review of more recently available information sources has more clearly demonstrated the importance of innovative technology approaches in the marketing domain.

2. IOT AND BIG DATA

The IoT is usually described as a network of interconnected people and devices. As such, the IoT enables sensing the environment, gathering, processing, and analysis of data anytime, at any place, using any path and any service, with or without human intervention. Presently, there is almost no domain untouched by IoT (Fig. 1). The IoT has a dramatic influence in numerous domains, resulting in completely revolutionized almost all aspects of our lives.
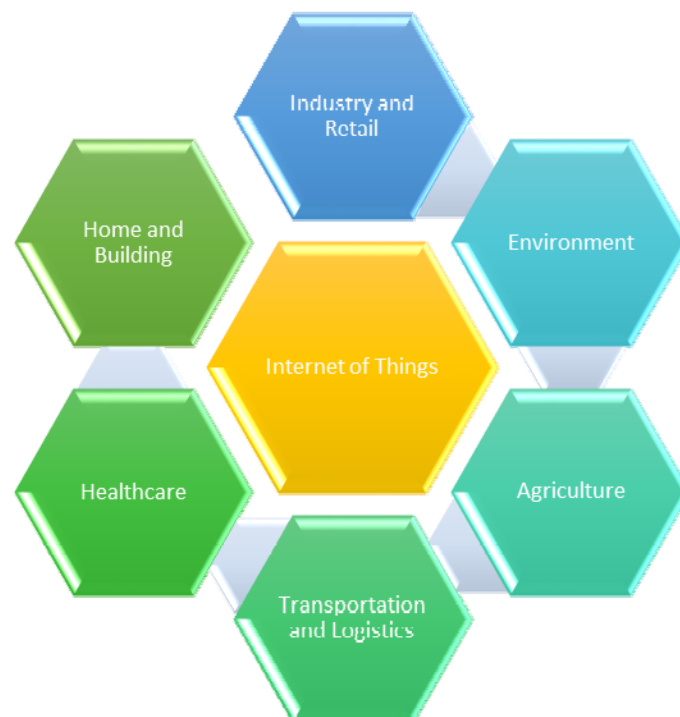

Figure 1: The IoT application domains
Source: Created by authors

The most significant benefits IoT brings in the marketing domain is the real-time marketers-consumers interaction. Instead of the traditional one-way communication, Internet, IoT, social media and mobile marketing enable two-way communications between the brand and consumer and consumer to consumer (Dubash, 2016).

By adding sensors to the world around us, the number of IoT devices continually rises, so the data become voluminous and heterogeneous than ever before. In other words, the IoT-driven data are mainly described with five V's: volume, velocity, variety, value, and veracity:

- *Volume – constantly increasing data quantity,*
- *Velocity – increased speed of data production and processing,*
- *Variety – diverse data types,*
- *Value – extraction the knowledge from data, and*
- *Veracity - data understandability.*

Manogaran et al. (2017) add additional 5V's to Big data:

- *Validity – data precision and accurateness,*
- *Variability – data consistency and value,*
- *Viscosity – the latency during data,*
- *Virality - the data transmission speed, and*
- *Visualization – the data representation.*

The collection and analysis of 5V's or 10 V's categorized IoT-driven data are of immense importance as they enable gaining insights and obtaining valuable knowledge in diverse domains. In general, knowledge can be (Manogaran et al., 2017):

- *Explicit knowledge - easy to collect, format and share, and*
- *Tacit knowledge - based on personal experience.*

Extraction of the hidden knowledge from Big data is essential for numerous improvements. Nevertheless, this task is quite challenging and includes (Maksimovic & Vujovic, 2017):

- *Remote, secure and safe data collection from multiple sources,*
- *Data analysis with the help of a variety of data mining techniques,*
- *Secure data sharing with those who can make real-time intelligent feedback.*

It is important to highlight that Big data life cycle includes the following phases: data sources, data integration, data storage, data analysis, and data visualization. With the help of Big data technologies, it is possible to find answers to what happened (descriptive analytics), why it happened (diagnostic analytics), what will happen (predictive analytics) and how to make it happen (prescriptive analytics) (BDVA, 2016). Knowing the answers to these questions means the retrospective and prospective data analysis, leading to reduced costs and improved outcomes. In other words, with the help of the IoT, Big data and predictive analytics, marketers gain the valuable information regarding customers such as what, when, how and where a customer is buying a product. This knowledge contributes to the substantial enhancements of products, servings, and customer experience (Dubash, 2016).

Even the IoT and Big data revolutionize numerous application domains, there are numerous challenges (e.g., infrastructure, costs, latency, standards, protocols, privacy, security) that have to be solved before they show their full potential. Special attention should be devoted to the IoT device authentication and strong security mechanisms in order to avoid customer's personal data become comprised.

2.1. Digital Marketing in the Age of Big Data

The result of facilitated data collection and analysis will be manifested in simplified market segments, which will consequently direct digital markets tailored to the strategy of each individual consumer. Digital marketers will have to personalize messages and change them on the go, following dynamic changes in consumer demands. Thanks to Big data, companies will be able to get data that will relate to each individual segment, but the entire collection, storage, and data analysis process need to be strictly controlled.

IoT and Big data have resulted in a massive amount of personalized data collected from different sources. In modern marketing approaches, these data have been used to boost digital marketing campaigns, making them more effective compared to traditional approaches. Targeted marketing campaigns are being realized through the employment of a consumer-centric approach. Detection of changing trends is performed based on the collected and processed consumer data in the marketing domain. A variety of soft computing techniques (i.e. clustering, classification, frequent pattern mining, outlier detection, fuzzy logic, neural networks, novel algorithms and visualization techniques) can be applied in order to derive valuable insights from the collected data and make smart and timely decisions (Fig. 2) (Vujovic & Maksimovic, 2015). Acquiring knowledge about consumers' lives, habits and desires opens a whole world of potential improvements in the marketing domain. In other words, a consumer-centric marketing paradigm enables digital marketers to adequately respond to consumers needs and preferences. Despite huge quantities of data and their usefulness, it is important to keep in mind that marketing is not analytic, but a strategic discipline (Earley Information Science, 2015).

The voluminous, heterogeneous and fast-generated data in the IoT paradigm play a key role in enhancements of the marketing domain. On the other side, data collection, processing, analysis, and storage represent a serious challenge. Collected data have to be processed accurately and on time in order to be useful. The development of bigger and more complex databases and advanced data analytics tools is mandatory in order to extract useful knowledge from gathering data and utilize it for relevant campaigns.

The utilization of Big data in digital marketing campaign results in more innovative and sophisticated marketing methods. The unprecedented quantity of information created by the IoT is immensely helpful in bringing forth a larger apprehension of the consumer demands and preferences. The Big data's role in boosting digital marketing is in data analytics, visualization, knowledge extraction and decision making (Innovation Enterprise, 2018):

1. Data analytics – is essential for more appropriate marketing team responses to customers demands and changes. Powerful data analytics tools are mostly quite expensive and license-needed. Due to lack of funds, smaller organizations mainly use data analytics as a service offered from a lot of remote service providers. Data analytic tools should be simple and affordable in order to enable real-time data analytics that will result in both marketers and customer satisfaction.

2. Data visualization – is mandatory for understanding and interpreting data. Adequate data visualization tools contribute significantly to the effectiveness of digital marketing campaigns. Visualization of data related to the consumers' behaviors and preferences, yearly inventory flow, shopping lull and peak times, and other data enables better comprehensions of data, leading to the more targeted and personalized action that result in bigger savings and increased profits and consumer satisfaction.

3. Decision making – is based on the knowledge obtained during data analysis and visualization. The availability of data will enable marketers to analyze them and based on the past experience make a better decision in the future.
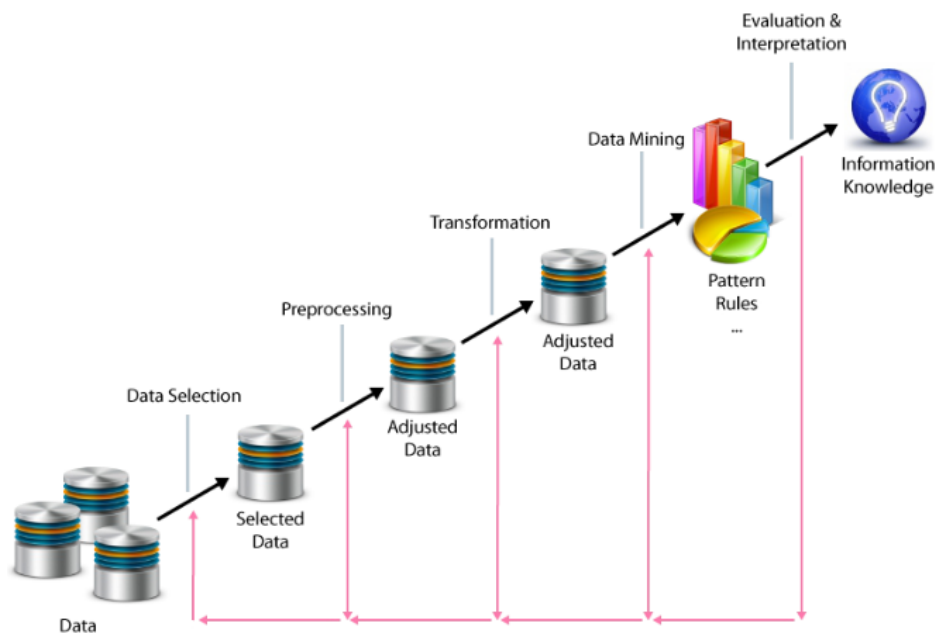

Figure 2: The extraction of knowledge
Source: Vujovic & Maksimovic, 2015

Some of data analytics sources used to boost the digital marketing campaigns are (Innovation Enterprise, 2018):

1. Web mining - uses automated tools to uncover and extract information from web documents and web servers, and usually encompasses web content mining, web structure mining, and web usage mining. E-Commerce web mining, text mining, and management of consumer behavior are quite useful in modern marketing campaigns (Jokar et al., 2016).

2. Social networks – Comments, shares, likes, and other activities on social networks provide a massive amount of heterogeneous data to marketers.

3. Search data – Tracking search information tools enable collection of data related to consumers intent, behavior, needs, and preferences via browser activity.

4. Transaction control - Every transaction that an individual performs gives certain information about him as a user that a company can use for the purpose of making their business decisions. By controlling transactions, companies can find out what consumers are buying, where are they buying, how much money they spend, then they can get information about orders, reservations which can help the company to find out which consumer preferences are in buying.

5. Crowdsourcing - a process of gathering public intelligence, opinion, work, or information through the web (via Internet, social media, smartphone, etc.).

As can be seen, technological progress, IoT and Big data, have significantly changed the collection of consumer-related data on their buying journey and the process of finding new consumers. The massive amounts of a variety of data help marketers to unlock consumers' lifestyle by discovering their habits, preferences, and desires, but also the knowledge about consumer reaction to different marketing engagements. Based on the collected data and the extracted knowledge

about why, when, and how a particular product or service are being used, marketers are capable to tailor their campaigns delivering more relevant marketing messages at the most adequate place and time, making the most out of their marketing budget. There is no doubt that only those marketers who know how to use data analysis and extracted valuable information in marketing campaigns will become best-in-class digital marketers and stay on the top.

3. IOT'S IMPACT ON DIGITAL MARKETING

IoT's omnipresence results in a vast quantity of heterogeneous data (structured and unstructured), that arrives at real-time speed and can be of uncertain provenance. The collection, processing, analysis, storage, privacy, security, and utilization of high-dimensional, high-velocity and high-variety IoT data are quite challenging. Dealing with IoT data, extraction of the knowledge and its appliance demand further technology investments. Nevertheless, the IoT and Big data have a tremendous impact on the digital marketing industry, opening numerous business opportunities. IoT's influence in digital marketing is illustrated in Fig. 3. The growth of IoT devices will make more data to analyze and sophisticated digital marketing platforms must be able to ingest, process, interpret and utilize IoT data, resulting in timely and personalized marketing approach and enhanced customer experience (Gainey, 2018). The IoT has already been fully adopted in B2B marketing, and due to the growing consumer approach to IoT devices, it will be also fully used in creating B2C marketing strategies.

Figure 3: IoT's impact on digital marketing
Source: Created by authors

Dealing with IoT data and extraction of insights is performed with the help of Cloud computing. Marketing professionals use Cloud computing in order to perform better predictive analysis. As IoT results in escalating volumes of data, their posting to the Cloud and getting response data back requires a larger bandwidth and a considerable amount of time. A possible solution to overcome these issues is to perform data analysis closer to the place where data are being generated. This is known as Fog computing and supports decentralized data processing that can be very useful in market segmentation.

IoT devices will help marketers to provide personalized products and services to their customers, and the sales team should complement the marketing strategy so that it is supported by IoT devices, as consumer data obtained from IoT applications has enormous influences on the digital marketing strategy. IoT devices generate large amounts of data and each interaction with consumers allows marketers to get information about consumer habits, preferences, needs, and desires. In this way, IoT represents digital marketing in a new dimension, as it affects the digital marketing strategy through all its components. Although there are several different digital marketing classifications, the division of digital marketing into the following components is dominant:

- Search Engine Optimization (SEO) - Thanks to the prominence of advanced IoT devices, individuals specializing in SEO will experience major changes in their industry. We are witnessing more frequent use of voice search over typing, which implies the need for a change of processing and analyzing natural language data by computers. It is anticipated that about 50 percent of all searches will be voiced by 2020. Moving

forward from keyword-based SEO content to intention-based writing is quite challenging in the IoT environment (Digital Marketing Institute, 2017). In the close future, the SEO strategy should be adapted to voice-based search. Via the IoT devices, search engines will provide direct information to consumers, therefore avoiding the need to visit the websites.

- Content Marketing - Among a variety of approaches used in marketing, content marketing is the most popular and personal. Creating quality and valuable content for consumers is a quite challengeable task for companies as it directly influences the interest, trust, and satisfaction of consumers. The IoT shows its benefits in minimizing the challenges of content marketing, increasing its impact at the same time. It can be achieved through the utilization of IoT data in the personalization of strategies. Offering consumers an experience instead of content results in a completely new company-consumer relationship. This refers to experiential marketing (Blue Bite, 2018).
- E-mail Marketing - is a process of sending commercial messages to a targeted group of consumers via e-mail. IoT omnipresence and instantaneous communication between machines enable revolution of e-mail campaigns, making it more powerful than it's ever been. Utilization of advanced tag protocols and the establishment of the basic e-mail metrics are required in the IoT-supported e-mail marketing. IoT has significantly contributed to e-mail automation, enabling marketers to easily create and send personalized e-mails at the right time (Campaign Monitor, 2019).
- Social Media Marketing – The immense IoT influence on Social Media Marketing has resulted in the appearance of a new term - Social IoT (SIoT). The SIoT adapts a service-oriented architecture (SOA) where diverse IoT devices collaborate with each other in order to realize a common goal (Afzal et al., 2019).
- Search Engine Marketing (SEM) - is the marketing process with the aim of getting traffic from search engines either by getting more free traffic (SEO) or paid traffic like PPC (Pay Per Click).

IoT-powered digital marketing brings numerous benefits to companies, such as better understanding of consumer needs, better company-consumer relationship, redirection of traffic to their website, strengthen company image, increased awareness of the brand, personalized and targeted delivery of products and services, increased sales and profits. In order to achieve all this, it is necessary to successfully coordinate with all the components of digital marketing.

4. CONCLUSION

The recent technological advancements have significantly changed the way that data collect, analyze, use, as well as marketers-customers interaction. Undoubtedly the IoT brings major changes in the marketing domain, implying the demand for marketers to accept and implement the innovations brought by technological progress. IoT and Big data pave the way for new digital marketing strategies that align with the consumers, their needs and expectations. Voluminous personal data collected via IoT, novel tools and platforms enable companies to analyze data and make intelligent decisions. Constant company-customer connection, delivery of most relevant messages to customers, and customers greater engagement are the main benefits IoT brings in digital marketing strategies. The future of digital marketing strategies is undoubtedly established on the IoT paradigm. However, there are certain challenges that should be overcome before IoT and Big data release immense digital marketing potential. Alongside quite challenging IoT data collection, processing, and storage, privacy and security of company- and consumer-related data are serious matters. Development and delivery of personalized marketing messages without being intrusive, require further intensive work and research in privacy and security technologies and standards. Nevertheless, the IoT and successful management of Big data in marketing domain will result in real-time smart decisions, optimization of the resources use, decreased costs, increased profits and enriched both consumer and company's satisfaction.

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