

5G in E-Commerce Activities

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Abstract:

5G services, on their own or in combination with other technologies, are likely to have a transformative impact on e-commerce activities.

Keywords: 5G services | e-commerce | mobile | Internet of Things | online shopping

Article:

5G cellular services are expected to be commercially available in developed countries later this year. These services, on their own or in combination with other technologies, are likely to have a transformative impact on e-commerce activities. The development of 5G networks, platforms, and devices certainly require high investments. There are, however, important economic benefits as well as psychological or intangible benefits associated with 5G. The faster speed of 5G networks and high-resolution screens of 5G-enabled devices might lead to a higher degree of customer willingness to engage in e-commerce activities, more time spent on e-commerce websites, and more purchases online. The features of 5G can also lead to a higher degree of effectiveness of e-commerce vendors' activities such as online advertising. Finally, faster speeds and higher-resolution screens are also associated with a higher degree of enjoyment (psychological or intangible benefits) when consumers engage in e-commerce activities.

Consider online video ads, which are a key component of an e-commerce ecosystem. In 2017, social video ad spending in the US was estimated at over \$4 billion dollars or 20 percent of the total social media ad sales.¹ Most video ad tags contain sophisticated tracking codes, making it possible for advertisers to track users' interaction with the ads.² Due to their larger file sizes, loading video ads is more difficult and time consuming than loading text or photos. This is a major concern because many viewers strongly dislike ads and other content that do not download quickly. In a survey conducted by Adobe in December 2017, about 80 percent of respondents said that if content takes too long to download, they will stop viewing it or switch to a different device. Likewise, another study conducted in 2017 by video analytics firm Mux found that 85 percent of respondents would stop watching a video if it takes too long to load.²

5G offers great promise and potential to address these challenges. With 5G, data transmission and processing speeds will rocket to new levels. 5G will thus help create and deliver effective online video advertising that can attract customers' attention and produce the best results. Likewise, 5G networks ensure that devices do not lose Internet connections when traveling from one location to another.

5G-RELATED PROGRESS SO FAR AND FUTURE PROSPECTS

The 5G technology standard was finalized in December 2017, and saw its first deployment in the 2018 Winter Olympics in South Korea. An estimate by the cellphone trade group GSMA suggests that there will be 1.2 billion 5G connections worldwide by 2025.³ Asia and the US are expected to take the lead in 5G, whereas Europe is reported to be lagging.⁴ The first commercial 5G projects are expected to be launched in the US in 2018.⁵ Japan and South Korea are expected to launch 5G in 2019 and China in 2020. South Korean cellular company KT's peak 5G network speeds were up to 3.5 gigabits per second (GBps) on Samsung tablets.⁶ It is worth noting that, in January 2018, South Korea's average mobile broadband download speed (which was the fourth highest in the world) was 133.05 megabits per second (Mbps). This means that peak speeds in 5G networks during the 2018 Winter Olympics were more than 26 times the country's mobile broadband download speed.

During the 2018 Olympics, KT provided 5G networks, Samsung provided 5G tablets, and Intel provided 5G platforms.⁷ Samsung's 5G-equipped tablets allowed viewers to switch among multiple cameras placed along the cross-country skiing route so they could track an athlete's real-time location on a 3D map of the entire skiing course. Many other companies are developing products and services that would help enrich the global 5G ecosystem. China-based tech companies ZTE and Huawei announced that they would release 5G smartphones by early 2019.

COMBINING 5G WITH OTHER TECHNOLOGIES TO STIMULATE E-COMMERCE

5G—in combination with other technologies such as artificial intelligence (AI), Internet of Things (IoT), blockchain, augmented reality (AR), and virtual reality (VR)—is likely to be a transformative force in the e-commerce industry and market. Table 1 highlights some examples and benefits of combining 5G with other technologies to enhance e-commerce.

Table 1. Combining 5G with other technologies to enhance e-commerce.

Technology	Examples of uses	Benefits of combining with 5G
Internet of Things (IoT)	Improve consumer experiences, track inventory in real time, manage orders more effectively	Will make it easier to transfer data created by IoT devices
Artificial intelligence (AI)	Order products online, track orders, and perform other ecommerce activities	Will make it possible to access additional information quicker and understand the environment and context better
Blockchain	Smart contracts can be used by online vendors to automate order fulfillment; supply-chain management; B2B e-commerce	Will address security issues and feed the information (for example, from IoT devices) required for a smart contract more efficiently
Augmented reality (AR) and virtual reality (VR)	AR-enabled apps allow a potential customer to virtually place real products in a real setting to provide a clear visualization of the products' use.	5G networks have higher bandwidth, reduced latency, and a higher degree of uniformity to deal with the complex worlds and sophisticated inputs that require processing huge amounts of data.

Internet of Things

A study found that 70 percent of retailers worldwide were ready to adopt IoT to improve consumer experiences.⁸ There are a number of ways in which e-commerce activities can benefit from IoT. For instance, IoT makes it easy to track inventory in real time and manage it more effectively. By doing so, human errors can be reduced. IoT can also help minimize waste, control costs, and reduce shortage. For instance, temperature-monitoring sensors can be used to maintain optimal temperatures for perishable products and send alerts when certain conditions are met.

Unsurprisingly, e-commerce companies have made heavy investments in IoT. China-based e-retailer JD.com's 3-System Fridge has sensors on every shelf and an internal camera. It registers the time and date when items are stored inside. The data is fed to a smart screen on the fridge's front side, which sends an alert when an expiration date is near. It can also order the next grocery list from JD.com based on the fridge's contents.⁹

Vast amounts of unstructured data are created by IoT devices, and the amount of data created is growing twice as fast as the available bandwidth.¹⁰ It is estimated that by 2020, a network capacity that is at least 1,000 times the level of 2016 will be needed.¹¹ The amount of communication that needs to be handled will also increase costs exponentially. The current 4G networks are not capable of handling this growth. 5G networks can play a role in addressing the potential bandwidth deficit.

Virtual and Augmented Reality

VR and AR are likely to emerge as driving forces in the e-commerce industry and market. By wearing a VR headset, a shopper can instantly find herself in a company's virtual shop, where she can "walk" around to explore items exactly as she would in the real shop. For instance, if she wants to know more about a new piece of jewelry in the shop, she can focus her sight on that item and see the relevant information needed to make a purchasing decision. If she wants to buy it, she can make the payment or add it to her cart and look for additional items.¹²

AR applies VR in the real world with live video imagery.¹³ For example, a furniture vendor can develop an AR-enabled app that allows a customer to point the mobile camera to the place where she wants to keep the furniture. The app places a 3D model of the furniture as an overlay on the living room's live image. The shopper now has a clear visualization of how the furniture would fit in her living room. In addition, by rotating the camera, she can see where the new furniture fits best.¹² This has already been done by some companies such as Lego and IKEA.¹⁴ Likewise, the home furnishings and decor company Wayfair launched its AR app WayfairView in 2016, which is available in Google Play.

The complexity and richness of the AR and VR worlds require processing a large quantity of data. Current 4G networks standards suffer from some limitations such as those related to bandwidth, latency, and uniformity, especially when the data needs to be fed remotely. In this regard, 5G is likely to unlock the full potential of VR and AR technologies. 5G's significantly faster speeds and lower latency would help overcome these weaknesses.¹⁵ 5G streams' transmission delay is about 1 millisecond, which is much shorter than human beings can notice.

5G's almost zero delay in transmission is thus likely to enrich customers' experiences with AR and VR technologies.

According to TimeTrade research, 85 percent of consumers prefer shopping in physical stores. Many features of brick and mortar stores cannot be replaced by e-commerce.¹⁶ However, AR and VR can create consumer experiences that are close enough to brick and mortar stores.

Retailers can also use AR and VR in concept testing to measure consumers' responses and feedback before implementing their ideas. Such testing can provide retailers with insights into consumers' emotional connection with the products, which can result in consumer adoption and market impact.¹⁷

Blockchain

Sophisticated applications of blockchain to facilitate e-commerce activities have been or are being developed. JD.com has implemented blockchain in its supply-chain management system and B2B e-commerce. In 2017, the system went live with beef manufacturer Kerchin as its first supply-chain partner. The company announced that JD.com would have more than 10 brands of alcohol, food, tea, and pharmaceutical products on its blockchain by the end of October 2017.¹⁸

One of the most high-profile future uses of blockchain is likely to be smart contracts. Online vendors can use smart contracts to automate fulfillment of orders for the delivery of digital products. In smart contracts that are executed "above" the blockchain, 5G can play a key role in feeding the information (for example, from IoT devices) more efficiently.

Cyberattacks have been a main concern for the growth of e-commerce. Such concerns are further heightened by the rapid growth of IoT networks, as IoT sensors carry sensitive information about their users. Securing these systems is thus important. Another key use of blockchain would be addressing security issues in 5G. Telecom companies can provide an eSIM (embedded SIM) or an app to a subscriber that creates a unique virtual identity that is encrypted and stored on a blockchain. Subscribers can use the unique IDs for automatic authentication on e-commerce websites. Blockchain also allows for secure P2P network solutions.

AI

AI-enabled devices are already playing important roles in helping consumers in e-commerce activities such as making buying decisions and tracking products. For instance, virtual assistants are transforming the way consumers purchase products online. Amazon's personal assistant Alexa, for example, has been integrated into Amazon products as well as those from other manufacturers. Customers can use Alexa to find information about local concerts through eBay's online ticket exchange company StubHub. In addition, they can arrange transportation to the event via Uber and order pre-event dinner from Domino's. The order status can be tracked in real time.¹⁹ Likewise, consumers can order flower arrangements with 1-800-Flowers.com through Alexa or Google assistant-enabled devices.²⁰ AI-enabled devices have already started handling unstructured information. For instance, social media platforms use AI to enable facial recognition and photo tagging.²¹

5G will dramatically improve consumer experiences with AI-based devices. With 5G, AI-based devices can access additional structured and unstructured information quicker and understand the environment and context better. Overall, AI-powered services will be more reliable in a wide range of contexts and situations in which they operate.

CONCLUSION

Some of the current challenges in the development of e-commerce can be overcome with the deployment of 5G networks, such as with IoT devices. Addressing the exponential growth in IoT devices will be no small feat. Current 4G networks, however, cannot handle all the data coming from IoT devices. 5G's higher data transmission and processing speeds will address this concern. Specifically, 5G (in combination with AI, VR, AR, and other technologies) will play a powerful role in transforming the e-commerce industry and market. Such a combination can result in a rich e-commerce ecosystem and a better customer experience.

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