



Online Eats "Food Courts"

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The decline in mall restaurants is just one result of the growth of Internet-based shopping. What else will online services "eat"?

Have you noticed the growing number of "for lease" signs in shopping malls? Those once-occupied spaces represent businesses that did not continue. COVID-19 certainly exacerbated this situation, but it was already underway. Here, we take a quick look at the data and how the free shipping, free returns, lack of parking hassles, mobile app shopping, and so on offered by "online" access are affecting physical retail businesses worldwide. And yes, this phenomenon is eating away at the "mall food courts." Many mall restaurants are gone for good.

During 2011–2019, online shopping (e-commerce) worldwide increased by 352.3% compared to the growth of all retail by 28.2% (Figure 1). E-commerce expansion in recent years is also driven by the heightened popularity of mobile devices for shopping. For example, during 2011–2019, mobile e-commerce worldwide grew by 3,265% (Figure 2).

This rapid online growth can be attributed to the diffusion of the Internet, especially via mobile devices. As of mid-2020, 4.57 billion people worldwide, or 60% of the world's total population, used the Internet.¹ Technological and business model innovations have also played a role.

For example, many consumers prefer to try products before buying them. For them, augmented reality (AR) helps. For instance, AR-enabled apps developed by companies such as LEGO, IKEA, and WayfairView allow customers to point mobile cameras to where they want a piece of furniture to go to have a clear visualization of how it would fit in the room. Chinese e-commerce company JD.com's AR beauty mirror helps customers "try" lipstick and other makeup items without actually applying them. E-commerce companies have recognized that many online shoppers, especially younger ones, want superfast delivery.² For example, in 2017, Amazon launched a two-hour Prime Now delivery service in Singapore.³

A 2019 analysis of 159 retail and consumer brands by software company Episerver indicated that 50% of all online shopping sessions came from smartphones.⁴ In the Chinese online market, which is 50% bigger than the U.S. market (Figure 3), about half of the online sales in 2015 were made with mobile devices compared to one-quarter in the United States.⁵ Another survey



IN THIS ISSUE

In this issue, we feature three articles.

In "A Comparison of Native and Cross-Platform Frameworks for Mobile Applications," the authors discuss analyzing popular environments for creating native and cross-platform applications as well as comparing identical applications developed using various tools. They argue that newer methods for developing such applications are an important field of research. However, they do not debate which environment is better for developing mobile applications, and they attest that there is little research available today that could answer this question. In addition, they explain that the results of their research may be able to help mobile application developers decide in which environment they should develop applications.

The author of the second article, "Visualizing Logical Correlation in Trace Data for System Debugging," describes a mechanism that enables debug engineers to extract and visualize a logical correlation among events or messages in system-level trace data. This author states that the mechanism

enables debug engineers to focus only on trace packets that are logically correlated to the concern under debug. In addition, he asserts that this should be a small portion of the captured trace data. However, just like any time-stamping mechanism, this requires instrumentation in the design and implementation of each component (and of the system).

In the third article, "Indian Sign Language Generation System," the authors propose a system for translating natural language into Indian Sign Language (ISL) in real time. They point out that the SL used by those who are hearing impaired is not easily understood. To bridge the gap between persons who are hearing impaired and those who do not understand SL, a system is proposed for translating natural language to ISL. In their article, they present a system to overcome these challenges. For building their proposed system, the authors employed Hamburg Notation System, Signing Gesture Markup Language, and 3D avatar animation. To demonstrate usability, they implemented a bilingual system for both English and Hindi. They claim that their proposed system has been tested using the Bilingual Evaluation Understudy (BLEU) score with 95% accuracy.

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found that, in 2016, 94% of China's online population used a mobile device to access the Internet, and 67% made purchases online using such devices, compared to only 34% in the United States.⁶

Especially thanks to smartphones and fast Internet connections, mobile online shopping has been an increasing trend worldwide, especially among younger consumers. A 2018 study conducted by the IBM Institute for Business Value and the National Retail Federation (NRF) among Generation Z (those born between 1997 and

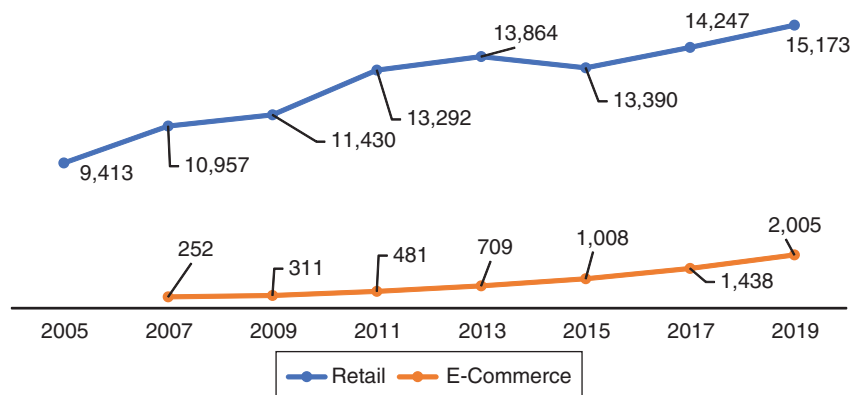


FIGURE 1. The total retail and e-commerce worldwide (in billions of U.S. dollars). (Data source: Euromonitor.)

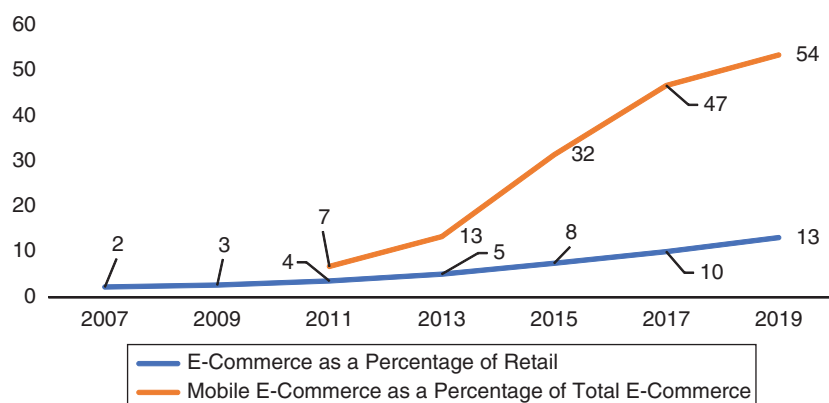


FIGURE 2. Comparing mobile e-commerce, total e-commerce, and retail.

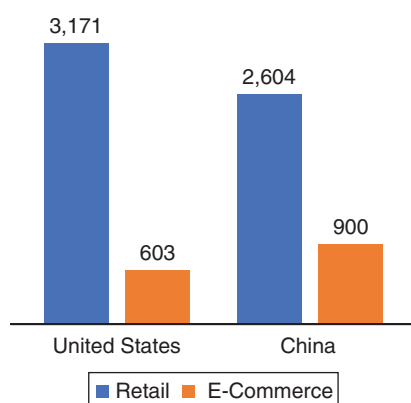


FIGURE 3. A comparison of retail and e-commerce in China and the United States in 2020 (in billions of U.S. dollars).

2015) consumers in 16 countries found that 48% had used a mobile app for shopping.⁷

This tendency has become more pronounced recently. For instance, in 2019, 36% of U.S. millennial consumers made all of their online purchases using mobile devices, compared to 16% in 2017.⁸

There are generational differences in the use of the Internet. In 2017, one-third of adults ages 65 years and older in the United States had never used the Internet, and half lacked Internet access at home.⁹ Some innovative companies have taken steps to introduce this population to online shopping. To improve its services for elderly people, Chinese e-commerce company Alibaba has recruited older consultants. Other Chinese e-commerce start-ups have focused their services on this generation.¹⁰


Younger consumers, on the other hand, have shown an increasing tendency to shop online. According to the online Web platform CouponFollow, which tracks and features coupon codes from online merchants, in 2019, millennial consumers in the United States (22–37 years old) made 60% of their purchases online (40% in stores), compared to 47% (53% in stores) in 2017.⁸

Various generations of customers also differ in the benefits expected from online shopping. In the IBM Institute for Business Value and NRF study,⁷ for the factors that influence Generation Z's decisions to shop online, the “ability to find what I want quickly,” “access to the best deals,” and “speedy shopping and checkout” were rated important by 49%, 41%, and 36% of respondents, respectively.⁷

In the past decade, the online shopping market experienced 12.5 times faster growth than the overall retail market, which means that online retail took a significant share away from physical retail. Internet shopping will continue to further encroach on physical retail, as 40% of the world's population is yet to go online.

Also, newer Internet-based consumers are likely to have different

profiles and expect varying attributes in firms' online offerings. As mentioned, engaging millennial and Generation Z shoppers requires different strategies and actions by e-commerce companies. For instance, compared to older consumers, speed and the value of money are more important for these groups. Never forget that organizations own those properties, and, eventually, they will pass the losses along to all of us.¹¹

Finally, what else will online services “eat”? They are already eating away at in-person education, working in the office, and face-to-face medical visits. We only pose the question as something for the Computer community to ponder. 

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