



Original Article

The Impact of Digital Technology Applications on Changes in Industrial Workers' Consumer Habits in the Post-COVID-19 Context

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Abstract: The COVID-19 pandemic, along with lockdowns and social distancing measures, has significantly altered and disrupted daily life and work routines, prompting notable shifts in consumer habits. Consumers in general and industrial park workers, in particular, have been learning to improvise and learn new habits. Typically, during periods of social distancing and lockdown due to COVID-19, as consumers were unable to go to the store, traditional shopping experiences were replaced by home deliveries. Moreover, technological advancements, demographic changes, and innovative coping strategies have blurred the boundaries between work, leisure, entertainment, and education, leading to the emergence of new habits. This study aims to examine the impact of digital adoption and the digital divide during COVID-19 and the change in shopping and payment habits among consumers, and in particular, industrial workers.

Keywords: COVID Pandemic, Consumer habits, Customer experience, Post-pandemic, Digital consumer.

1. Introduction

The COVID-19 pandemic has surged through Vietnam in four significant waves, affecting the nation on a wide scale, with nearly 1.7 million people infected with SARS-CoV-2 and over 31 thousand reported deaths. Since the first case was identified on January 23, 2020,

Vietnam has seen a total of more than 11.6 million infections, more than 10.6 million people recovering, and over 43 thousand lives lost [1]. The first implementation of social distancing was in April 2020, involving 13 thousand people in Ha Loi village, Me Linh, Hanoi. During the second wave of COVID-19, in August 2021, Da

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Nang was the first province to enforce social distancing. Subsequently, the third and fourth waves of the pandemic occurred in 2021, with all 63 provinces and cities across Vietnam implementing various forms of social isolation measures, spanning from the northern to the southern regions. By the end of 2022, people's socio-economic and daily activities began to gradually return to the “new normal”.

Even before the COVID-19 epidemic, online purchasing had already been on the rise following the 2017 e-commerce boom. Contactless shopping had gained significant popularity, facilitated through mobile meal delivery apps such as Grabfood, Shopeefood, Befood, etc. With the outbreak of COVID-19 pandemic, restriction on movement and gathering in crowded places led businesses and schools to switch to remote work and study. Consequently, essential purchases such as food and shifted predominantly to online platforms, with items being delivered directly to homes. There has been a noticeable shift from cash to digital payments through banks.

The expansion of e-commerce, technological advances, and the widespread integration of the Internet have spurred notable shifts in consumer behavior in the digital age. However, along with these transformations come challenges related to the management of personal information and the rise of online fraud. Research conducted by Cloudflare shows that Internet usage has increased by more than 25% in most major cities around the world due to the impact of the blockade [2]. During the pandemic, payments conducted through QR codes has seen a rapid rise, particularly in everyday transactions, such as bill payments (71%), shopping in the retail sector (58%), and 57% of transactions at supermarkets [3].

This study also addresses the digital divide, emphasizing how variances in household income levels contribute to discrepancies in access to and utilization of information technology and communication tools.. This divide significantly

impacts digital learning opportunities, particularly for students in large families with low incomes.

The term “digital divide” refers to the economic and social inequality in accessing and utilizing information and communications technology (ICT). Article 4 of the 2006 Information Technology Law defines the “digital gap as the difference in conditions and ability to use computers and information infrastructure to access information and knowledge sources” [4].

Indeed, the concept aligns closely with the definition of the digital divide provided by the OECD (Organization for Economic Cooperation and Development). The OECD refers to the digital divide as the gap between individuals, households, businesses, and geographical areas in the context of different socio-economic levels when considering access to ICT and Internet usage for related activities [5].

Although, at the current time, the COVID-19 pandemic has declined and people have returned to a new normal life, the habit changes brought about by social distancing persists. The article focuses on examining the effects of COVID-19 on consumer activities and digital consumption behaviors.

2. Research Methods

This study used data gathered from the scientific and technological mission of the Vietnam National University, Hanoi, focusing on “Identifying changes in the lifestyle of Vietnamese workers after the COVID-19 pandemic and policy implications”. The research involved a rapid, extensive cross-sectional online survey conducted in early 2024 in the residential area of workers working at the North Thang Long Industrial Park, Hanoi City. The survey encompassed 192 cases and employed a combination of retrospective and structural questions to evaluate the influence of COVID-19 on alterations in the shopping and payment habits of industrial zone workers.

Before giving the questionnaire supplied via Google Forms, participants were provided with a brief overview of the study, its objectives, and a pledge of anonymity and confidentiality. Participants were encouraged to respond truthfully to the questions. The questionnaire consisted of inquiries regarding the consumer behavior changes before and during the epidemic. Throughout the survey, participants had the option to discontinue their participation and abandon the questionnaire before submitting it, with the assurance that their responses would not be retained until they clicked the "submit" button after completing the questionnaire.

For this study, the principle of maximum diversity was employed to recruit a representative sample. A quota sampling technique was used to identify the quotas based on different demographic variables, such as age, gender, socio-economic status, place of residence, and especially smartphone usage. Descriptive statistics of the participants' baseline characteristics and responses were provided as frequency and percentage for categorical variables in this study. Table 1 displays the demographic details of the included participants (n = 192). The sample exhibits a slightly higher participation of females (58.5%).

Table 1. Some demographic characteristics of participants

Characteristics		Value	
		N	%
Gender	Male	80	41.67
	Female	112	58.33
Socio-economic status	Upper	18	9.38
	Middle	74	38.54
	Lower	100	52.08
Marital Status	Married	92	47.92
	Single	100	52.08

In addition, supplemented its argument with the document analysis method to provide additional evidence. Data were gathered from scientific articles in domestic and international scientific journals and prestigious organizations such as the OECD, Department of E-Commerce and Digital Economy, Ministry of Industry and Trade, etc.

3. Some Issues of the Digital Surge and Consumer Behavior Post COVID-19 Pandemic

One of the most notable lifestyle changes during the COVID-19 pandemic was the increasing reliance on technology [6]. Consumer patterns, shopping habits, and social interactions have undergone significant transformations. The traditional method of shopping and consumption has seen a significant shift from in-store

purchases to utilizing online channels and home delivery services [7]. Even within the same household, internet connectivity has become the essential norm to maintain a vibrant social life, leading to a surge in the use of communication apps and video messaging [8]. In this study, the article addresses several changes in consumer behavior driven by digital technology and some challenges associated with managing this issue (such as the digital divide and the risk of online fraud).

3.1. Changes in internet access purposes

The survey results from the study indicated that prior to the COVID-19, industrial zone workers mainly used the internet for activities such as Watching movies, listening to music (59.9%), reading newspapers (58.6%), and social networks (56.8%). However, with the

emergence of COVID-19 and the subsequent implementation of lockdown and social distancing measures, individuals found themselves with more free time and greater flexibility in their schedules, as they could receive home deliveries at any time. Post-COVID-19, there was a notable shift in the purpose of internet usage. While watching movies and listening to music remained the most common activities at 60.9%; online shopping with 59.4%; and accessing email (58.3%).

In addition, there have been significant changes in the items purchased online. The survey results show that before COVID-19, spa and beauty services (43.7%) and music, games, and videos (45.8%) were the most commonly purchased items. Food (7.8%), household appliances (6.3%), and clothing, shoes, and cosmetics (17.7%) were the least purchased items online. After COVID-19, this list had altered. The clothing, shoes, and cosmetics category ranked as the top category (69.3%); followed by household appliances (64.6%). Spa and beauty services ranked last with 9.89%.

3.2. Increasing Digitalization

As restrictions on outdoor activities intensified, global Internet traffic has exploded. Many companies have encouraged employees to work from home and limit in-person presence in the workplace to minimize the spread of the virus. Even essential workers are encouraged to stay at home. Consequently, millions of individuals find themselves at home, engaging in activities such as browsing social media, utilizing online video conferencing services to stay connected, and accessing live streaming platforms more frequently than ever before. Collaboration apps and software like Microsoft Teams and Zoom have witnessed a significant increase in downloads, up to 90% compared to the average weekly downloads before the COVID-19 outbreak [2].

In Vietnam, to stay connected with family and friends, most households with the internet

have embraced platforms like Zalo and Facebook video calls. Meanwhile, office workers and students use Zoom meetings or Google meetings to stay in touch with their workplaces or attend classes remotely from home. According to Jagdish Sheth (2020), Zoom meeting has even been extended to telehealth, enabling virtual visits with physicians and other healthcare providers. Additionally, the emergence of influential individuals, known as key opinion leaders, with large followings on social media platforms like TikTok and Facebook, is expected to significantly influence consumer shopping behaviors and habits [9]. Especially after the COVID-19 pandemic, the trend of remote working has become more popular, with approximately 20-25% of the workforce in advanced economies now has the capability to work from home for 3-5 days per week. Moreover, these workers can dedicate 28 to 30% of their time working remotely without any decline in productivity [10].

Moreover, workers are no longer confined by limitations on the number of jobs they can undertake. For instance, a worker in Vietnam now can now work for a company based in another country, or engage in multiple projects alongside their primary employment. Geographical boundaries no longer limit work opportunities. During the COVID-19 epidemic, remote working has proven to be effective and introduced a new working model. Combining face-to-face interactions with remote work is a solution to adapt to fluctuations in the natural and social environment [11].

The survey results indicate a shift in the average daily internet usage before and after COVID-19, with consumers spending between 1 to 5 hours accessing the internet. After COVID-19, there has been an increase in the percentage of consumers spending over 7 hours accessing the internet compared to before. This trend raises concerns regarding mental and physical health as individuals spend too much time accessing the Internet while juggling work and other online activities (Figure 1).

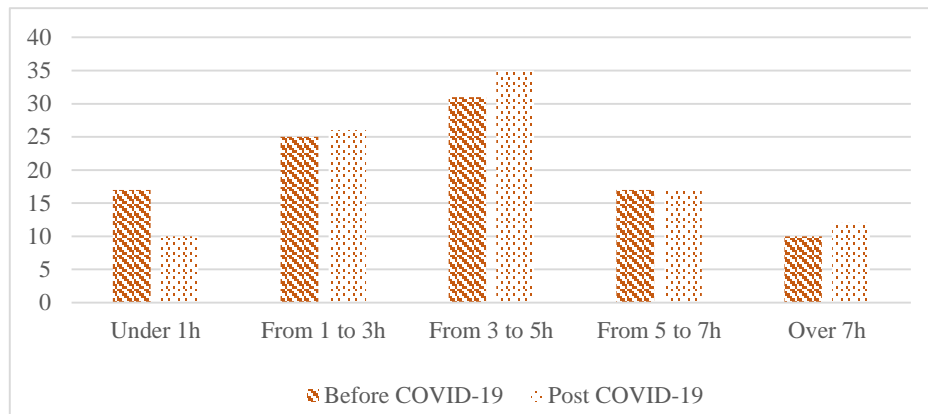


Figure 1. Average daily internet access time.

3.3. Discover Talent and Develop Yourself Through Online Social Platforms

As people enjoy more flexibility at home, they're exploring cooking recipes, refining talents, and crafting new creative content like music performances and knowledge sharing. This trend extends to diversifying online shopping experiences. With some individuals gaining significant reach, consumers are becoming commercially capable content producers. YouTube, TikTok, and e-commerce platforms have partnered with content creators to create and develop many potentially innovative and successful videos commercially.

Recently, content creation for TikTok has been seen as a lucrative job for users. Besides being able to earn a stable income, this profession does not restrict time or work discipline. In the Adobe "Future of Creativity" Study: 165M+ Creators Joined Creator Economy Since the 2020 report, more than 165 million creators have joined the Creator Economy, with significant growth across all markets. The data shows the new trend of the Gen Z generation, those born from 1997. According to the report, 33% of respondents have engaged in part-time content creation; 77% said they started making money from online platform content, and 47% identified this field as contributing more than half of their monthly

income [12]. Many young people are betting on the creative economy and inspiring the pursuit of non-traditional jobs.

3.4. Payment Via Digital Banks

Digital payments with e-wallets and digital banks may play a crucial role in the post-pandemic situation. Because digital payments are contactless, governments will encourage them, which may explode. The gig economy and work-from-home situations will also boost this.

In 2021, COVID-19 has seriously affected the commercial and service activities of Vietnam in particular and the world in general. However, Vietnam's e-commerce still maintains a stable growth rate of 16%, with retail sales reaching \$13.7 billion in 2021; the share of e-commerce retail sales in the total retail sales of goods and consumer services nationwide reached 7%, an increase of 27% compared to the same period in 2020 [13].

Cashless payments also witness rapid growth through the frequency of using electronic wallets, contactless payments, and QR codes, with contactless card payments being the most popular in the food and beverage category, with 67% of consumers increasing their use of this method in 2020. According to the State Bank of Vietnam, by the end of April 2021, there were over 79 organizations providing payment

services implementing online payments and 44 organizations offering mobile payments [3].

The survey results of this research also show that 83.85% of survey participants have made cashless transactions, and 73.44% believe they can go without cash for 3 days. Consumers are also using home delivery services more than before the COVID-19 pandemic. Additionally, about 44.27% of consumers used home delivery services for the first time during the pandemic. It is forecasted that in the future, around 80% of transactions will be conducted online with home delivery [14].

Although open banking has been around for a while, it is still relatively new to most people. The concept of "open banking" is still new in Vietnam. The term Open Banking first appeared in The Revised Payment Services Directive of the European Parliament and the Council (PSD2, Directive (EU) 2015/2366) in 2015 [15]. Open Banking allows third-party payment service providers to access customers' banking data through the Open Application Programming Interface (Open API) is secured. Open banking is expected to bring more options to decide which financial products consumers need, easily finding products that suit their actual needs. However, currently, the features most used by Vietnamese consumers are bank transfers and reminders to pay bills for electricity, water, television, the Internet, telecommunications, etc.

Because it is still in the process of developing both the legislative environment for open banking activities and banking goods and services, this means that many circumstances that have not yet occurred and cannot be fully foreseen may become a reality. This poses a risk to information security and consumer personal information security. Open banking distributes financial information, and access to financial data gives you more power over your consumers. Customers cannot be 100% certain about what a corporation does with their data. Banks must re-implement risk management policies and maintain safety and security when their

interactions move from dealing directly with consumers to engaging with service providers.

3.5. Digital Divide

The transformation of numerical systems revolves around three primary pillars: digital government, digital economy, and digital society. These pillars rely on digital infrastructure, internet accessibility, the IT workforce, people's technological literacy and proficiency, as well as the nation's technological advancement, among other factors. These elements collectively contribute to assessing the digital disparity.

Amid the COVID-19 pandemic, online learning remains imperative to curb future outbreaks. However, it poses a significant challenge for families facing financial hardship, as not all can afford essential devices for their children's education. With social distancing measures in place, both parents and students find themselves compelled to work and learn remotely, often incurring substantial expenses to acquire the necessary equipment.

Responding to this dilemma, the Vietnamese Government has introduced a policy enabling students from disadvantaged backgrounds to borrow up to 10 million VNĐ each for purchasing online learning tools, as per Decision No. 09/2022/QĐ-TTg issued by the Prime Minister. Additionally, Prime Minister Phạm Minh Chính has initiated the "Waves and Computers for Children" program, garnering support from various businesses, individuals, and social organizations to facilitate underprivileged children's access to online education during the COVID-19 era.

From a positive perspective, the COVID-19 period serves as an impetus for enhancing Vietnam's digital infrastructure. Some Vietnamese provinces, notably Quang Ninh and Bac Ninh, have embraced smart city initiatives amid the pandemic, marking significant strides toward technological advancement [16].

3.6. Online Fraud

According to the latest statistics from the Information Security Department, Ministry of Information and Communications, in the first 11 months of 2023, this unit has received over 15,900 reports of fraud cases sent by Vietnamese Internet users through alert systems, of which more than 91% are related to impersonation and fraud in the banking and financial sector [17].

According to the latest data from the Kaspersky Security Network (KSN), in 2022, Kaspersky detected and blocked 41,989,163 different network threats from the Internet on the computers of KSN participants in Vietnam [17].

In total, there are more than 24 different forms of fraud, among which the most prominent are "easy job, high salary" scams, stock investment scams, high-profit forex investment scams, impersonation of relatives, friends in accidents, impersonation of police, tax officials tricking users into installing fake apps to take control of their phones, etc causing many people to be deceived, losing large amounts of money, up to billions of VND [18].

Another type of scam that the Information Security Department cautions people about is impersonating a bank and obtaining OTP passwords. According to the Information Security Department, shortly after completing the procedures to open a debit card at a bank branch, a customer in Ho Chi Minh City received a call from an unknown number requesting the OTP code (transaction confirmation password) to confirm and set a date for receiving the card.

Furthermore, the Information Security Department says that the end of the year is ideal for a series of discount campaigns and mega promotions to boost shopping demand. As a result, customers are more willing to spend, which allows fraudsters to create scenarios such as selling low-quality items at low rates, offering presents, arranging prize-winning programs, etc.

With the fast advancement of digital technology, artificial intelligence not only

provides obvious benefits but also poses serious cybersecurity concerns. Fraud and targeted assaults provide the most significant challenge to AI technology today, with more complicated fraud scenarios, particularly when combining deep fake and chat GPT. The capacity to gather and analyze user data using AI enables the development of complex fraud schemes, making fraud detection more difficult for users.

4. Conclusion

The COVID-19 lockdown and social distance tactics have resulted in substantial shifts in consumer behavior, including a fundamental shift in the usage of digital technology across multiple work and living domains. As people adjust to extended periods of solitude, the tendency toward adopting modern technology rationalizes work procedures, education, and consumerism with greater ease. Embracing these digital developments has the potential to modify deeply rooted habits.

In recent years, in Vietnam, the economy has been closely linked to the development of digital technology; however, the management policies are still in the process of improvement, and the digital infrastructure system is not yet evenly distributed among regions. This poses challenges that need to be addressed by managers.

COVID-19 has resulted in increased social media usage on Facebook, Instagram, TikTok, and Zoom. Consumers are more interested in the virtual world than the actual world, as seen in video games and virtual sports [9]. The negative aspects of e-commerce, such as online fraud and the digital divide, may be expected. Digital surveillance requires more attention and stricter execution. This might also serve as a path for future studies of their influence on society.

Related to the topic of the digital divide, research directions related to improving management policies and measures to reduce the digital gap, increase access to digital learning opportunities for children in difficult

circumstances and remote areas, ensuring the achievement of sustainable development goals.

Furthermore, research topics should be expanded to include studies on digital payments and their impacts during crises, as well as providing aid and support to affected communities and managing similar disasters like COVID-19 in the future.

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