

Comparison of Online Shopping Behavior Before and During Pandemic towards Generation Z

<https://doi.org/10.25008/jkiskisi.v9i2.1137>

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Submitted: November 13, 2024, **Revised:** November 30, 2024, **Accepted:** Dec. 2, 2024

Accredited by Kemdikbudristek No. 152/E/KPT/2023

Abstract - The increasing adoption of digital platforms has significantly influenced consumer behavior, particularly among Generation Z, necessitating a deeper understanding of how external crises reshape purchasing patterns. Grounded in consumer behavior theories, this study explores how key factors such as quality consciousness, green consumer value, materialism, and impulsive buying influence Generation Z's decision-making styles—extensive, limited, and habitual—before and during the COVID-19 pandemic. The primary objective is to uncover the extent to which these factors evolved during the pandemic and their implications for communication strategies in digital marketing. Using a Partial Least Squares - Multi-Group Analysis (PLS-MGA) framework, the study employs a quantitative approach with data collected from Generation Z respondents across two time periods: pre-pandemic (2018, n=130) and mid-pandemic (2022, n=250). The analysis evaluates the relationships between variables and compares changes over time to identify significant shifts in consumer priorities. Results reveal that external global events amplify internal consumer values, with quality consciousness and green consumer value becoming more pronounced during the pandemic. Additionally, materialism and impulsive buying gained significance across all decision-making styles, highlighting the psychological impact of the crisis. These findings contribute to the field of communication by emphasizing the need for brands to adapt their messaging to reflect evolving consumer priorities, particularly in times of uncertainty. This research underscores the role of communication in fostering trust and aligning with sustainable and quality-driven values, offering actionable insights for marketers targeting Generation Z.

Keywords: Consumer behavior; Online Shopping Behavior; Generation Z; Covid-19; PLS-MGA

Introduction

The rapid advancement of the internet has transform global communication and consumer behavior, ushering in an era of electronic commerce that has fundamentally reshaped how consumers purchase products and services (Tao, 2023). Since 2014, the number of online shoppers worldwide has increased significantly, rising from 1.32 billion to 2.14 billion in 2021 (Statista Search Department, 2021). This growth was further catalysed by the COVID-19 pandemic, which accelerated the global

adoption of e-commerce. Online retail sales surged from approximately \$2 trillion in 2019 to \$2.5 trillion in 2020, and further to \$2.9 trillion in 2021, driven by lockdowns and health concerns that restricted in-person shopping (United Nations Trade and Development, 2022).

In Indonesia, the COVID-19 pandemic led to a 23% increase in e-commerce transactions in 2020, with 63 million new users adopting online shopping (The International Trade Administration, 2021). The Gross Merchandise Value (GMV) of Indonesia's e-commerce market reached an estimated \$32 billion by 2021, reflecting robust and sustained growth despite logistical and infrastructural challenges (Negara & Soesilowati, 2021). These patterns indicate a sustained upward trajectory for e-commerce in Indonesia, aligning with global trends of increased online consumer activity during the pandemic.

This momentum is projected to persist, with forecasts predicting a 51.03% increase in e-commerce users between 2024 and 2029, reaching approximately 99.1 million users by 2029—marking the ninth consecutive year of growth (Statista Research Department, 2024). Notably, Generation Z consumers are leading this shift, allocating a higher proportion of their income to online shopping compared to older generations. On average, individuals aged 18-25 spend 5.4% of their monthly income, or approximately 4.6 million Rupiah, on e-commerce, highlighting their pivotal role in driving Indonesia's digital economy (Lidwina, 2021).

In a broader context, strict government measures to limit public mobility and interpersonal interactions have transformed everyday activities. Many of these transitioned to hybrid or fully online formats, reshaping consumer behaviour and emphasizing the importance of long-studied factors such as quality consciousness, the need for uniqueness, and green consumer value (Babin, 1984; Park & Lessig, 1977; D. Aaker, 1991). Digital platforms have empowered consumers with tools to evaluate product and service quality, personalize purchases to meet individual preferences, and adopt more sustainable and eco-conscious consumption habits (Kahle, 1995; Mick, 1996).

These shifts have been widely analysed in academic research, which highlights key behavioural trends. As direct interpersonal interactions diminished, the demand for robust online customer support grew significantly (Bettencourt, 1997). Materialism has seen a resurgence in the digital age, with consumers placing increased value on acquisition and ownership (Tian et al., 2001). Social media platforms and targeted advertising have amplified impulsive buying tendencies and hedonic shopping behaviours (Kahle, 1995; Mick, 1996). Additionally, peer reviews and influencer endorsements have become influential factors in online purchasing decisions, particularly among younger demographics such as Generation Z (Faber & O'guinn, 1992; Shim & Gehrt, 1996). The convenience of online shopping has also fuelled compulsive buying behaviours, driven by the intrinsic satisfaction derived from acquisitions (Park & Lessig, 1977).

Building on this extensive body of research, the present study examines the behaviour shifts observed in Generation Z during the pandemic. Specifically, it seeks to address two research questions:

- RQ1. What factors influenced Generation Z's consumer behaviour before the pandemic?
- RQ2. How have these factors evolved or changed during the pandemic?

By exploring these questions, this study aims to provide valuable insights into how Generation Z has adapted to the unique challenges and opportunities presented by the pandemic, contributing to a deeper understanding of the evolving consumer landscape

Theoretical Framework

Generation Z's Digital Consumption

Gen Z, typically identified as individuals born between the mid-1990s and the early 2010s, is distinguished by its immersion in the digital age from birth. This generation has grown up with the internet, smartphones, and social media as integral components of their daily lives. Their developmental years, characterized by rapid technological advancements and a globalized world, have profoundly influenced their perspectives and behavioral patterns. Recognizing the unique attributes and potential of this demographic, companies are increasingly focusing on engaging with Gen Z, anticipating them as a pivotal market segment for the future (Nowak et al., 2006).

A salient characteristic of Gen Z, as observed in various studies, is their discerning consumptive behavior, often driven by digital influences and a global perspective (Parker et al., 2004). In a recent study conducted by Populix Corporation during the pandemic in 2021, it was revealed that Gen Z

significantly patronizes online shopping platforms. Specifically, individuals aged between 18-21 years constituted 35% of the online shoppers, closely followed by the 22-28 age bracket at 33%. Dominant online marketplaces in Indonesia, such as Shopee, Tokopedia, and Lazada, emerged as the platforms of choice for this demographic during this period. The determinants of online purchasing behavior for Gen Z were predominantly influenced by factors like price discounts, shipping costs, and habitual behaviors shaped by digital experiences.

In the contemporary consumer landscape, the process of product evaluation, brand recognition, and attitude formation has been significantly influenced by multidimensional communication channels. Social media platforms play a pivotal role in shaping Gen Z's perceptions, offering brands the opportunity to engage consumers through exposure, attention, and interactive experiences (Kim & Ko, 2010). These platforms disseminate diverse messages from various sources, including peers, celebrities, marketers, and digital influencers, all of which significantly impact Gen Z's purchasing decisions (Bearden & Etzel, 1982; Logan et al., 2012; Pelling & White, 2009; Schulze et al., 2014).

Type of Consumer Buying Decision

In the realm of consumer behavior, the intricate art of decision-making has always been a focal point of study. Solomon et al. (2016) delved deeply into this subject, shedding light on the various facets of how consumers make choices. They identified three primary pathways through which individuals navigate their purchasing decisions. The first pathway is the process of extended problem-solving. This method is a meticulous one, drawing parallels with the traditional cognitive decision-making perspective. Imagine a consumer standing at a crossroads, taking in every signpost, and analyzing each direction before taking a step.

They commence with recognizing the problem or the need, prompting them to seek more information. This information search might involve reading reviews, asking friends, or even sampling products. After gathering sufficient information, they methodically evaluate the alternatives available. It's akin to weighing scales, measuring the pros and cons until they find the balance that suits them best. This eventually culminates in the product choice and purchase. But the journey doesn't end there; after the purchase, they reflect upon the outcomes, determining if their decision was right or if there's room for improvement in future choices. However, not all decisions warrant such detailed introspection. Enter the second pathway: limited problem-solving. This is the streamlined, more direct route. Here, individuals already possess a roadmap or perhaps they're following well-trodden paths.

The motivation to search for extensive information or rigorously weigh each option isn't as intense. They might lean on a past experience, a recommendation from a friend, or a familiar brand name. This approach is about efficiency, utilizing cognitive shortcuts or heuristics. It's like having a compass in hand, guiding the direction without needing to analyze every detail of the journey. Lastly, there's the realm of habitual decision-making. This is instinctual, almost second nature. Think of it as a traveler who's taken the same route countless times, moving forward without a second thought. Many of our day-to-day purchasing choices fall into this category. The decisions are so ingrained and routine that one might not even be consciously aware of making them until perhaps revisiting their shopping list or cart. It's like breathing, an act so natural and automatic. Researchers aptly term this spontaneous and subconscious process "automaticity."

Generation Z's Online Shopping Behavior

Online shopping behavior encompasses the patterns and processes consumers exhibit when purchasing products or services over the internet. This digital activity has surged in popularity, with various platforms and e-commerce sites facilitating such transactions. A myriad of factors influence online shopping behavior, including quality consciousness, consumer's needs for uniqueness, green consumer value, support for customer, materialism, brand equity, conformity motivation, impulsive buying, hedonic shopping value, vanity, consumer ethnocentrism, susceptibility to reference group influence, compulsive buying, and personal integrative benefit (D. Aaker, 1991; Alnawas & Aburub, 2016; Babin, 1984; Faber & O'guinn, 1992; Haws et al., 2010; Kahle, 1995; Mick, 1996; Netemeyer et al., 1995; Park & Lessig, 1977; Richins, 1987; Shim & Gehrt, 1996; Shimp & Sharma, 1987; Tian et al., 2001).

Online shopping has become an integral part of modern consumerism, with more individuals opting for the convenience, variety, and flexibility that digital platforms offer. As the e-commerce

landscape continues to evolve, understanding the nuances of online shopping behavior has become paramount for businesses and marketers alike (Al-Gasawneh et al., 2021). This behavior, influenced by a myriad of factors, dictates how consumers navigate, select, and ultimately decide on their purchases in the vast digital marketplace. Quality consciousness in the digital sphere pertains to an online shopper's tendency to emphasize and seek products that are viewed as superior in quality and reliability, underscoring the digital consumer's preference for excellence.

Moreover, the consumer's need for uniqueness in the online realm is manifested as a quest to find products or services that stand out, allowing the consumer to maintain individuality (Aksoy et al., 2022; Mohammadi et al., 2021). In addition, green consumer value in e-commerce points to the importance placed on eco-friendly and sustainable products, with digitally savvy consumers increasingly looking for brands that uphold environmental values (Riva et al., 2022). Support for the customer in online platforms emphasizes the necessity for continuous assistance and guidance, ensuring a seamless navigation experience (Cintamür, 2023; Sheth et al., 2023).

Materialism, in the context of online shopping, denotes the value placed on acquiring digital material goods, often associated with personal success or societal status (Mick, 1996). Brand equity in e-commerce is perceived as the worth and trust associated with a brand, built through positive online experiences and reviews (D. Aaker, 1991; D. A. Aaker, 1991; D. A. Aaker & McLoughlin, 2010).

On the other hand, conformity motivation (Chaouali et al., 2016; Cheung & Prendergast, 2006) relates to consumers adapting their online purchase behaviors based on digital trends or peer recommendations. Impulsive buying in the digital space indicates spontaneous purchases made while scrolling through online platforms, driven by targeted advertisements or limited-time offers. Hedonic shopping value online centers on the joy and experience derived from virtual shopping, where browsing and discovery become a source of pleasure (Atulkar & Kesari, 2017; Çavuşoğlu et al., 2020).

Vanity drives the quest for products that enhance one's digital image, often shared on social media platforms. Consumer ethnocentrism, even in the digital age, leans towards a preference for locally produced or domestic online goods. In the era of influencers, susceptibility to reference group (Park & Lessig, 1977) influence indicates the impact of peer reviews, influencers, and digital communities on a consumer's purchasing choices. Compulsive buying online (Aksoy et al., 2022) reflects uncontrollable purchasing urges, often triggered by emotional needs.

Lastly, the personal integrative benefit in online shopping pertains to the internal rewards a shopper feels post-purchase, such as a sense of accomplishment or digital self-expression (Dani & Maulana, 2020; Ren et al., 2019). Understanding these elements offers invaluable insights into the evolving landscape of digital consumer behavior and preferences.

Hypothesis and Framework Development

The personal integrative benefit in online shopping pertains to the internal rewards a shopper feels post-purchase, such as a sense of accomplishment or digital self-expression (Wieland, 2023). It's worth noting that the landscape of these online shopping behaviors has potentially undergone significant shifts from the pre-pandemic to the pandemic era (Rushi & Pradhan, 2022). For instance, the emphasis on quality consciousness might have increased as consumers became more cautious about the products they purchased due to health and safety concerns (Hutagalung & Rachman, 2023).

The need for uniqueness may have been amplified as online shopping became more ubiquitous, and individuals sought differentiation in an increasingly crowded digital space (Al Hamli & Sobaih, 2023). Moreover, the pandemic could have intensified green consumer values, with a heightened global focus on sustainability and health (Hutagalung & Rachman, 2023). Support for customers became even more crucial as online shopping surged, requiring businesses to adapt swiftly to provide seamless digital experiences (Wieland, 2023).

Materialism may have seen a dip initially due to economic uncertainties but rebounded as consumers sought comfort in online purchases (Rushi & Pradhan, 2023). Brand equity became paramount, with trust playing a significant role in purchase decisions amidst uncertain times (Al Hamli & Sobaih, 2023).

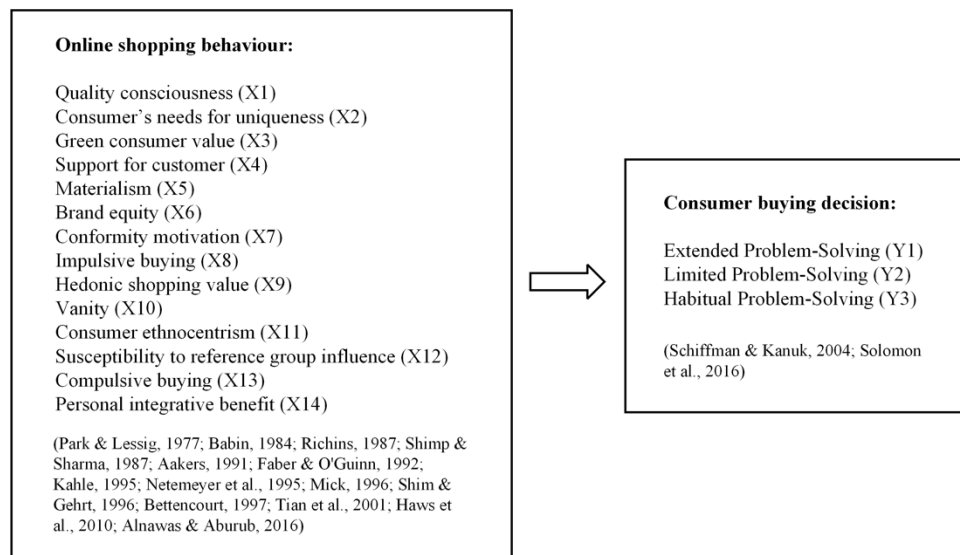


Figure 1. Research Framework

Conformity motivation may have been bolstered by the collective experience of the pandemic, leading to more unified consumer trends (Wieland, 2023). Meanwhile, the rise in impulsive buying could be attributed to the increased screen time and targeted advertising (Rushi & Pradhan, 2023), while hedonic shopping value may have been a refuge for many seeking solace in the pleasures of online browsing (Al Hamli & Sobaih, 2023). Vanity, driven by the boom in virtual meetings and social media connectivity, became a pronounced factor (Wieland, 2023). Consumer ethnocentrism might have seen a surge, given the global disruptions in supply chains and a renewed focus on local products (Hutagalung & Rachman, 2023).

Influencers and peer groups possibly played an even more significant role as people turned to trusted voices in a world filled with information overload (Al Hamli & Sobaih, 2023). Compulsive buying, driven perhaps by stress or the need for comfort, might have increased for some (Rushi & Pradhan, 2023). All these shifts underscore the dynamic nature of online shopping behavior, emphasizing the need for businesses to remain adaptive and vigilant (Wieland, 2023). Understanding these elements and their evolutions offers invaluable insights into the ever-changing landscape of digital consumer behavior and preferences (Al Hamli & Sobaih, 2023). Given these arguments, we put forth the subsequent hypotheses:

Extensive Problem-Solving

- H1a. There is a significant difference in how Gen Z's quality consciousness influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H1b. There is a significant difference in how Gen Z's consumer's needs for uniqueness influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H1c. There is a significant difference in how Gen Z's green consumer value influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H1d. There is a significant difference in how Gen Z's support for customer influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H1e. There is a significant difference in how Gen Z's materialism influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H1f. There is a significant difference in how Gen Z's brand equity influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H1g. There is a significant difference in how Gen Z's conformity motivation influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H1h. There is a significant difference in how Gen Z's impulsive buying influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.

- H1i. There is a significant difference in how Gen Z's hedonic shopping value influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H1j. There is a significant difference in how Gen Z's vanity influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H1k. There is a significant difference in how Gen Z's consumer ethnocentrism influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H1l. There is a significant difference in how Gen Z's susceptibility to reference group influence influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H1m. There is a significant difference in how Gen Z's compulsive buying influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H1n. There is a significant difference in how Gen Z's personal integrative benefit influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.

Limited Problem-Solving

- H2a. There is a significant difference in how Gen Z's quality consciousness influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2b. There is a significant difference in how Gen Z's consumer's needs for uniqueness influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2c. There is a significant difference in how Gen Z's green consumer value influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2d. There is a significant difference in how Gen Z's support for customer influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2e. There is a significant difference in how Gen Z's materialism influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2f. There is a significant difference in how Gen Z's brand equity influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2g. There is a significant difference in how Gen Z's conformity motivation influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2h. There is a significant difference in how Gen Z's impulsive buying influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2i. There is a significant difference in how Gen Z's hedonic shopping value influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2j. There is a significant difference in how Gen Z's vanity influenced their extensive problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2k. There is a significant difference in how Gen Z's consumer ethnocentrism influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2l. There is a significant difference in how Gen Z's susceptibility to reference group influence influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2m. There is a significant difference in how Gen Z's compulsive buying influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H2n. There is a significant difference in how Gen Z's personal integrative benefit influenced their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.

Habitual Problem-Solving

- H3a. There is a significant difference in how Gen Z's quality consciousness influenced their habitual problem-solving buying decisions between the pre-pandemic and during-pandemic periods.

- H3b. There is a significant difference in how Gen Z's consumer's needs for uniqueness influenced their habitual problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H3c. There is a significant difference in how Gen Z's green consumer value influenced their habitual problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H3d. There is a significant difference in how Gen Z's support for customer influenced their habitual problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H3e. There is a significant difference in how Gen Z's materialism influenced their habitual problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H3f. There is a significant difference in how Gen Z's brand equity influenced their habitual problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H3g. There is a significant difference in how Gen Z's conformity motivation influenced habitual limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H3h. There is a significant difference in how Gen Z's impulsive buying influenced their habitual problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H3i. There is a significant difference in how Gen Z's hedonic shopping value influenced their habitual problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H3j. There is a significant difference in how Gen Z's vanity influenced their habitual problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H3k. There is a significant difference in how Gen Z's consumer ethnocentrism influenced their habitual problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H3l. There is a significant difference in how Gen Z's susceptibility to reference group influence influenced their habitual problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H3m. There is a significant difference in how Gen Z's compulsive buying influenced their habitual problem-solving buying decisions between the pre-pandemic and during-pandemic periods.
- H3n. There is a significant difference in how Gen Z's personal integrative benefit habitual their limited problem-solving buying decisions between the pre-pandemic and during-pandemic periods.

Material and Methodology

Research Design

This research use the Partial Least Squares - Multi-Group Analysis (PLS-MGA) framework to analyze behavioral shifts and persistent patterns before and during the pandemic. PLS-MGA's ability to examine relationships across diverse groups makes it especially suitable for exploring the unique experiences of Generation Z during this transformative period. Guided by the quantitative approach outlined by Saunders et al. (2019), this study collects and statistically analyzes numerical data, providing robust and empirically grounded insights. The research also adopts a causality perspective, delving into the 'why' and 'how' of generational behavior changes, offering a comprehensive understanding of the dynamics shaping Generation Z's perceptions and actions.

The conceptual framework employs hierarchical component models (HCMs), also known as second-order constructs, which integrate higher-order constructs (HOCs) and their subcomponents, lower-order constructs (LOCs) (Hair et al., 2018; Putra, 2022; Sarstedt et al., 2019). The HOCs are online shopping behavior (X) and customer buying decision (Y). For online shopping behavior (X), LOCs include factors such as quality consciousness, uniqueness, green consumer value, materialism, brand equity, impulsive buying, and conformity motivation. For customer buying decisions (Y), LOCs focus on extensive, limited, and habitual problem-solving.

Unit Analysis and Survey Strategy

This study analyzed two datasets collected at distinct time points. The first survey in 2018 captured pre-pandemic behaviors, while a follow-up survey in 2022 examined shifts during the pandemic. The 2022 survey included 250 Generation Z participants, compared to 130 in 2018, reflecting an increased willingness to engage in research during challenging times. This dual-survey approach provides a comprehensive understanding of behavioral changes over time.

Result and Discussion

Result Measurement Model Evaluation

The outer model is crucial in PLS-SEM (Partial Least Squares Structural Equation Modeling) for assessing validity and reliability by illustrating the relationships between observed indicators and latent variables. According to Hair et al. (2018), convergent validity requires loading factors exceeding 0.70, while Hair et al. (2017) suggest reflective indicator loadings above 0.50 are sufficient for reliability. To balance these standards, a benchmark of 0.60 is commonly adopted.

In higher-order component models (HCM), the repeated indicator approach is used to estimate relationships between higher-order constructs and their indicators (Putra, 2022). This method links lower-order construct indicators directly to the higher-order construct, repeating them to assess the strength and direction of relationships. Ensuring these loadings are significant and align with expectations is essential to validate the hierarchical structure of the model (Andriani & Putra, 2019).

Convergent validity was further assessed using the average variance extracted (AVE), with a benchmark of >0.50. The findings showed all items had loading values above 0.7 and p-values below 0.05, confirming indicator reliability. The AVE values also exceeded 0.5, indicating that latent variables explained over half the variance in their reflective indicators, thus validating the model’s structure.

Table 1. Construct Validity and Reliability

	CA	CR (rho_a)	CR (rho_c)	AVE	Fornell Larcker Criterion																		
					X	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	Y	Y1	Y2	Y3
X	0.976	0.980	0.978	0.659	0.878																		
X1	0.974	0.977	0.981	0.928	0.657	0.963																	
X2	0.854	0.858	0.903	0.700	0.744	0.684	0.837																
X3	0.959	0.980	0.970	0.891	0.784	0.621	0.680	0.944															
X4	0.897	0.896	0.930	0.769	0.744	0.648	0.790	0.621	0.877														
X5	0.853	0.854	0.900	0.694	0.697	0.683	0.641	0.764	0.577	0.833													
X6	0.859	0.860	0.904	0.703	0.610	0.640	0.653	0.593	0.599	0.614	0.838												
X7	0.819	0.818	0.893	0.736	0.291	0.222	0.283	0.320	0.260	0.341	0.208	0.858											
X8	0.880	0.881	0.926	0.806	0.631	0.955	0.639	0.564	0.629	0.658	0.335	0.198	0.898										
X9	0.849	0.851	0.899	0.689	0.838	0.639	0.730	0.468	0.674	0.724	0.580	0.307	0.610	0.830									
X10	0.874	0.875	0.914	0.727	0.708	0.590	0.624	0.469	0.544	0.716	0.545	0.313	0.546	0.556	0.852								
X11	0.912	0.915	0.939	0.794	0.634	0.959	0.660	0.615	0.623	0.679	0.679	0.228	0.891	0.633	0.594	0.891							
X12	0.882	0.883	0.919	0.740	0.734	0.594	0.624	0.506	0.583	0.770	0.531	0.267	0.573	0.162	0.162	0.592	0.860						
X13	0.840	0.847	0.893	0.677	0.906	0.742	0.875	0.568	0.740	0.718	0.689	0.408	0.706	0.466	0.466	0.723	0.650	0.823					
X14	0.911	0.916	0.938	0.790	0.671	0.641	0.502	0.545	0.746	0.565	0.625	0.225	0.615	0.620	0.500	0.589	0.526	0.780	0.889				
Y	0.968	0.969	0.972	0.743	0.264	0.169	0.229	0.262	0.183	0.283	0.139	0.618	0.162	0.260	0.243	0.182	0.203	0.339	0.148	0.862			
Y1	0.939	0.939	0.956	0.846	0.585	0.489	0.491	0.675	0.429	0.639	0.452	0.223	0.466	0.683	0.682	0.478	0.744	0.702	0.409	0.166	0.920		
Y2	0.917	0.920	0.942	0.802	0.802	0.639	0.813	0.649	0.458	0.595	0.601	0.210	0.604	0.720	0.592	0.617	0.675	0.162	0.742	0.144	0.500	0.896	
Y3	0.926	0.928	0.948	0.820	0.787	0.659	0.785	0.663	0.877	0.630	0.607	0.285	0.636	0.746	0.593	0.639	0.651	0.466	0.734	0.219	0.471	0.791	0.906

Note. The numbers in bold represent the square root of AVE correlation between the variables themselves. CA indicates Cronbach’s alpha. CR indicates composite reliability. AVE indicates average variance extracted. X indicates online chopping behaviour. X1 indicates quality consciousness. X2 indicates consumer’s needs for uniqueness. X3 indicates green consumer value. X4 indicates support for customer. X5 indicates materialism. X6 indicates brand equity. X7 indicates conformity motivation. X8 indicates impulsive buying. X9 indicates hedonic shopping value. X10 indicates vanity. X11 indicates consumer ethnocentrism. X12 indicates susceptibility to reference group influence. X13 indicates compulsive buying. X14 indicates personal integrative benefit. Y indicates consumer buying decision. Y1 indicates extensive problem solving. Y2 indicates limited problem solving. Y3 indicates habitual decision making.

The testing results confirmed that all values met the required thresholds, with the loading factor and average variance extracted (AVE) exceeding 0.50, demonstrating that each latent variable was effectively measured. The next step involved addressing potential discriminant validity issues, focusing on correlation values among the model components. While no convergent validity concerns were identified (Ramayah et al., 2018), discriminant validity was assessed using methods such as the Fornell-Larcker Criterion, HTMT (heterotrait-monotrait ratio), and cross-loadings.

Henseler et al. (2015) highlighted the limitations of the Fornell-Larcker Criterion in detecting discriminant validity issues and recommended the HTMT approach. To ensure discriminant validity, bootstrapping with 5,000 resamples was applied, setting confidence intervals (CI) at 95.0% and 5.0%. None of the dimensions showed CI values exceeding 1.00, confirming the absence of discriminant validity issues. Additionally, cross-loading analysis verified that indicators exhibited higher loading factors on their respective constructs, reinforcing discriminant validity (Hair et al., 2017).

After validating the indicators, reliability was evaluated using Cronbach's alpha and composite reliability. According to Dijkstra and Henseler (2015), composite reliability should exceed 0.7, and Cronbach's alpha should surpass 0.6 to confirm construct reliability. All constructs in this study met these benchmarks, establishing their reliability and ensuring the robustness of the measurement model.

Structural Model Evaluation

With the validity and reliability of the measurement model confirmed, the next step was testing the structural model to examine the relationships between latent variables. Following Ramayah et al. (2018), the structural model was assessed using inner VIF values, the coefficient of determination (R^2), model fit, and predictive relevance (Q^2). To detect multicollinearity, inner VIF values were analyzed, revealing no strong or perfect correlations between independent variables. As per Hair et al. (2018), all VIF values were below 5.00, confirming the absence of multicollinearity.

The coefficient of determination provided further insights into the model's explanatory power. Online shopping behaviour explained its endogenous variable with a variance of 100% ($R^2 = 1.000$), indicating the model fully captured this construct without external influences. In contrast, the buying decision variable showed an R^2 value of 55.1%, suggesting that 44.9% of its variance was influenced by factors not included in the model. Further analysis revealed that extensive problem solving explained 88.4% of its variance, limited problem solving 91.9%, and habitual decision making 91.2%, with the remaining percentages indicating external influences.

Predictive relevance was evaluated using the Q^2 metric, with values above zero confirming the model's ability to predict endogenous latent variables, as highlighted by Putra and Ardianto (2022). Model fit was assessed using the standardized root mean square residual (SRMR) and the normed fit index (NFI). According to Ramayah et al. (2018) and Hair et al. (2018), the SRMR value below 0.10 indicated a good fit for the model (see Table 2).

Table 2. Structural Model Assessment

Construct	R-square	R-square adjusted	Q^2 predict	Model Fit Index	Saturated model	Estimated model
X	1.000	1.000	1.000	SRMR	0.076	0.077
Y	0.551	0.549	0.544	d_ULS	118.367	120.367
Y1	0.884	0.884	0.464	d_G	n/a	n/a
Y2	0.919	0.919	0.517	Chi-square	Infinite	Infinite
Y3	0.912	0.912	0.493	NFI	n/a	n/a

Note. X indicates online chopping behaviour. Y indicates consumer buying decision. Y1 indicates extensive problem solving. Y2 indicates limited problem solving. Y3 indicates habitual decision making. SRMR indicates standardized root mean square residual.

Findings

After evaluating the structural model, hypothesis testing was conducted to confirm or refute the study's proposed hypotheses. This assessment relied on the path coefficient and T-Statistic values obtained via the bootstrapping method. Of the 42 hypotheses tested, 16 were accepted, as detailed in Table 3.

Among the factors examined, quality consciousness emerged as a significant determinant of purchasing decisions, particularly for Generation Z. This factor reflects the importance consumers place on the quality of products or services. Before the pandemic, Gen Z's quality consciousness did not significantly influence extensive problem-solving behaviours in online shopping, as indicated by a p-value below 0.05. However, the pandemic introduced uncertainties in supply chains, product

availability, and quality assurance, prompting a shift in behaviour. During this period, quality consciousness became a notable factor in extensive problem-solving, with a path coefficient of 0.063 and a highly significant p-value of 0.000.

The pandemic also altered Gen Z's approach to limited problem-solving. Previously, quality consciousness had no significant effect in this context (p-value < 0.05). However, during the pandemic, its influence became apparent, with a path coefficient of 0.064 (p=0.000), highlighting an increased emphasis on quality even in simpler purchasing scenarios. Similarly, habitual decision-making, often regarded as automatic, showed no significant relationship with quality consciousness before the pandemic. Yet, during the pandemic, quality considerations played a role, with a path coefficient of 0.065 (p=0.000).

These findings led to the acceptance of hypotheses H1a, H2a, and H3a. They underscore the profound impact of global events on consumer values and demonstrate Gen Z's adaptability and evolving online shopping behaviours during periods of uncertainty.

Table 3. Hypothesis Testing

H	Path	Main Model (All Groups Included)			Each Groups (Pre Vs. During Pandemic Setting)						Significant Different Between Group	
		O	O/STDEV	P	O (Pre)	O (Dur)	O/STDEV (Pre)	O/STDEV (Dur)	P (Pre)	P (Dur)	O (Pre Vs. Dur)	P (Pre Vs. Dur)
		H1a	X1 → Y1	0.032	5.957	0.000	0.008	0.063	0.807	8.975	0.420	0.000
H1b	X2 → Y1	0.068	13.172	0.000	0.071	0.062	7.249	12.168	0.000	0.000	0.009	0.396
H1c	X3 → Y1	0.035	6.506	0.000	0.013	0.068	1.531	12.949	0.126	0.000	-0.055	0.000
H1d	X4 → Y1	0.059	10.998	0.000	0.082	0.049	9.935	8.176	0.000	0.000	0.034	0.003
H1e	X5 → Y1	0.064	13.620	0.000	0.080	0.055	9.868	11.246	0.000	0.000	0.025	0.021
H1f	X6 → Y1	0.070	14.227	0.000	0.080	0.061	10.794	11.285	0.000	0.000	0.019	0.052
H1g	X7 → Y1	0.053	14.998	0.000	0.060	0.046	8.914	12.532	0.000	0.000	0.014	0.080
H1h	X8 → Y1	0.056	13.670	0.000	0.065	0.048	9.677	10.599	0.000	0.000	0.017	0.038
H1i	X9 → Y1	0.068	16.093	0.000	0.071	0.063	7.925	14.213	0.000	0.000	0.008	0.401
H1j	X10 → Y1	0.072	13.644	0.000	0.073	0.064	7.800	11.409	0.000	0.000	0.009	0.421
H1k	X11 → Y1	0.076	14.033	0.000	0.080	0.068	9.019	11.310	0.000	0.000	0.011	0.282
H1l	X12 → Y1	0.071	14.630	0.000	0.078	0.062	10.699	11.476	0.000	0.000	0.016	0.095
H1m	X13 → Y1	0.068	12.018	0.000	0.080	0.059	8.881	9.515	0.000	0.000	0.021	0.067
H1n	X14 → Y1	0.072	10.987	0.000	0.069	0.069	5.840	10.440	0.000	0.000	0.000	0.980
H2a	X1 → Y2	0.032	5.914	0.000	0.008	0.064	0.806	8.908	0.420	0.000	-0.056	0.000
H2b	X2 → Y2	0.069	13.139	0.000	0.072	0.063	7.535	12.071	0.000	0.000	0.009	0.389
H2c	X3 → Y2	0.036	6.491	0.000	0.013	0.069	1.536	12.885	0.125	0.000	-0.056	0.000
H2d	X4 → Y2	0.060	10.933	0.000	0.083	0.049	10.576	8.170	0.000	0.000	0.034	0.003
H2e	X5 → Y2	0.066	13.580	0.000	0.081	0.056	10.406	11.361	0.000	0.000	0.025	0.016
H2f	X6 → Y2	0.072	14.485	0.000	0.081	0.062	11.297	11.196	0.000	0.000	0.019	0.047
H2g	X7 → Y2	0.054	15.056	0.000	0.061	0.047	9.391	12.542	0.000	0.000	0.014	0.070
H2h	X8 → Y2	0.057	13.723	0.000	0.066	0.049	9.808	10.689	0.000	0.000	0.017	0.035
H2i	X9 → Y2	0.070	16.118	0.000	0.072	0.064	8.167	14.123	0.000	0.000	0.008	0.398
H2j	X10 → Y2	0.073	13.857	0.000	0.074	0.066	7.979	11.501	0.000	0.000	0.009	0.420
H2k	X11 → Y2	0.078	14.286	0.000	0.081	0.069	9.206	11.358	0.000	0.000	0.011	0.280
H2l	X12 → Y2	0.072	14.935	0.000	0.079	0.063	11.029	11.553	0.000	0.000	0.016	0.089
H2m	X13 → Y2	0.070	12.312	0.000	0.081	0.060	9.244	9.620	0.000	0.000	0.021	0.060
H2n	X14 → Y2	0.074	11.159	0.000	0.070	0.070	5.964	10.393	0.000	0.000	0.000	0.982
H3a	X1 → Y3	0.032	5.953	0.000	0.008	0.065	0.806	8.827	0.420	0.000	-0.056	0.000
H3b	X2 → Y3	0.069	13.241	0.000	0.072	0.064	7.412	11.931	0.000	0.000	0.008	0.427
H3c	X3 → Y3	0.036	6.516	0.000	0.013	0.070	1.534	12.801	0.125	0.000	-0.057	0.000
H3d	X4 → Y3	0.060	11.029	0.000	0.083	0.050	10.173	8.082	0.000	0.000	0.033	0.004
H3e	X5 → Y3	0.065	13.760	0.000	0.081	0.056	10.112	11.150	0.000	0.000	0.025	0.021
H3f	X6 → Y3	0.072	14.221	0.000	0.081	0.063	11.031	11.449	0.000	0.000	0.018	0.056
H3g	X7 → Y3	0.054	15.123	0.000	0.061	0.047	9.098	12.462	0.000	0.000	0.014	0.086
H3h	X8 → Y3	0.057	13.768	0.000	0.066	0.049	9.724	10.600	0.000	0.000	0.017	0.043
H3i	X9 → Y3	0.069	16.126	0.000	0.072	0.064	8.009	14.163	0.000	0.000	0.007	0.441
H3j	X10 → Y3	0.073	13.768	0.000	0.074	0.066	7.915	11.593	0.000	0.000	0.008	0.459
H3k	X11 → Y3	0.077	14.130	0.000	0.080	0.070	9.167	11.539	0.000	0.000	0.011	0.310
H3l	X12 → Y3	0.072	14.742	0.000	0.078	0.063	10.889	11.710	0.000	0.000	0.015	0.104
H3m	X13 → Y3	0.069	12.164	0.000	0.081	0.060	9.154	9.754	0.000	0.000	0.021	0.068
H3n	X14 → Y3	0.074	11.021	0.000	0.070	0.071	5.969	10.566	0.000	0.000	-0.001	0.974

Note. H indicates hypothesis. O indicates original sample. M indicates sample mean. O/STDEV indicates t-statistics. P indicates p values. O (Pre) indicates original sample of pre-pandemic setting group. O/STDEV (Pre) indicates t-statistics of pre-pandemic setting group. P (Pre) indicates p values of pre-pandemic setting group. O (Dur) indicates original sample of during-pandemic setting group. O/STDEV (Dur) indicates t-statistics of during-pandemic setting group. P (Dur) indicates p values of during-pandemic setting group. O (Pre Vs. Dur) indicates original sample of differentiation between pre and during-pandemic setting group. P (Pre Vs. Dur) indicates p values of differentiation between pre and during-pandemic setting group. X1 indicates quality consciousness. X2 indicates consumer's needs for uniqueness. X3 indicates green consumer value. X4 indicates support for customer. X5 indicates materialism. X6 indicates brand equity. X7 indicates conformity motivation. X8 indicates impulsive buying. X9 indicates hedonic shopping value. X10 indicates vanity. X11 indicates consumer ethnocentrism. X12 indicates susceptibility to reference group influence. X13 indicates compulsive buying. X14 indicates personal integrative benefit. Y indicates consumer buying decision. Y1 indicates extensive problem solving. Y2 indicates limited problem solving. Y3 indicates habitual decision making.

In terms of green consumer value, it was found that during pre-pandemic, this had no significant impact on Gen Z's extensive problem-solving behaviors ($p < 0.05$). However, during the pandemic, this changed, with green consumer values significantly influencing extensive problem-solving, reflected by a path coefficient of 0.068 ($p = 0.000$). Similar transformations were observed in limited problem-solving and habitual decision-making, where green consumer values previously had no significant impact. During the pandemic, path coefficients of 0.069 and 0.070, respectively (both $p = 0.000$), indicated a newfound alignment of Gen Z's decisions with their green values. These findings supported hypotheses H1c, H2c, and H3c, demonstrating how external events can intensify internal consumer values and reshape behaviors.

The role of customer support also evolved during the pandemic. Pre-pandemic, customer support had minimal influence on Gen Z's extensive problem-solving behaviors ($p < 0.05$). However, the pandemic highlighted its importance, with a path coefficient of 0.049 ($p = 0.000$) during this period. This trend extended to limited problem-solving (0.049, $p = 0.000$) and habitual decision-making (0.050, $p = 0.000$), indicating that Gen Z increasingly valued customer support in straightforward and routine purchasing decisions. These findings led to the acceptance of hypotheses H1d, H2d, and H3d, emphasizing the growing importance of customer support in shaping purchasing behaviors during uncertain times.

The role of customer support also evolved during the pandemic. Pre-pandemic, customer support had minimal influence on Gen Z's extensive problem-solving behaviors ($p < 0.05$). However, the pandemic highlighted its importance, with a path coefficient of 0.049 ($p = 0.000$) during this period. This trend extended to limited problem-solving (0.049, $p = 0.000$) and habitual decision-making (0.050, $p = 0.000$), indicating that Gen Z increasingly valued customer support in straightforward and routine purchasing decisions. These findings led to the acceptance of hypotheses H1d, H2d, and H3d, emphasizing the growing importance of customer support in shaping purchasing behaviors during uncertain times.

Furthermore, in terms of materialism, defined as the importance placed on acquiring and possessing material goods, played a notable role in Gen Z's online shopping behaviors during the pandemic. Pre-pandemic, materialistic tendencies had no significant influence on extensive problem-solving behaviors, as evidenced by a p-value below 0.05. However, during the pandemic, materialism began to influence extensive problem-solving, with a path coefficient of 0.055 ($p = 0.000$). This trend also extended to limited problem-solving and habitual decision-making, where pre-pandemic data showed no significant effect. During the pandemic, both decision-making processes were influenced by materialism, with path coefficients of 0.056 ($p = 0.000$) for each. These findings supported hypotheses H1e, H2e, and H3e, highlighting the increasing importance of materialistic values in Gen Z's purchasing behaviors during uncertain times.

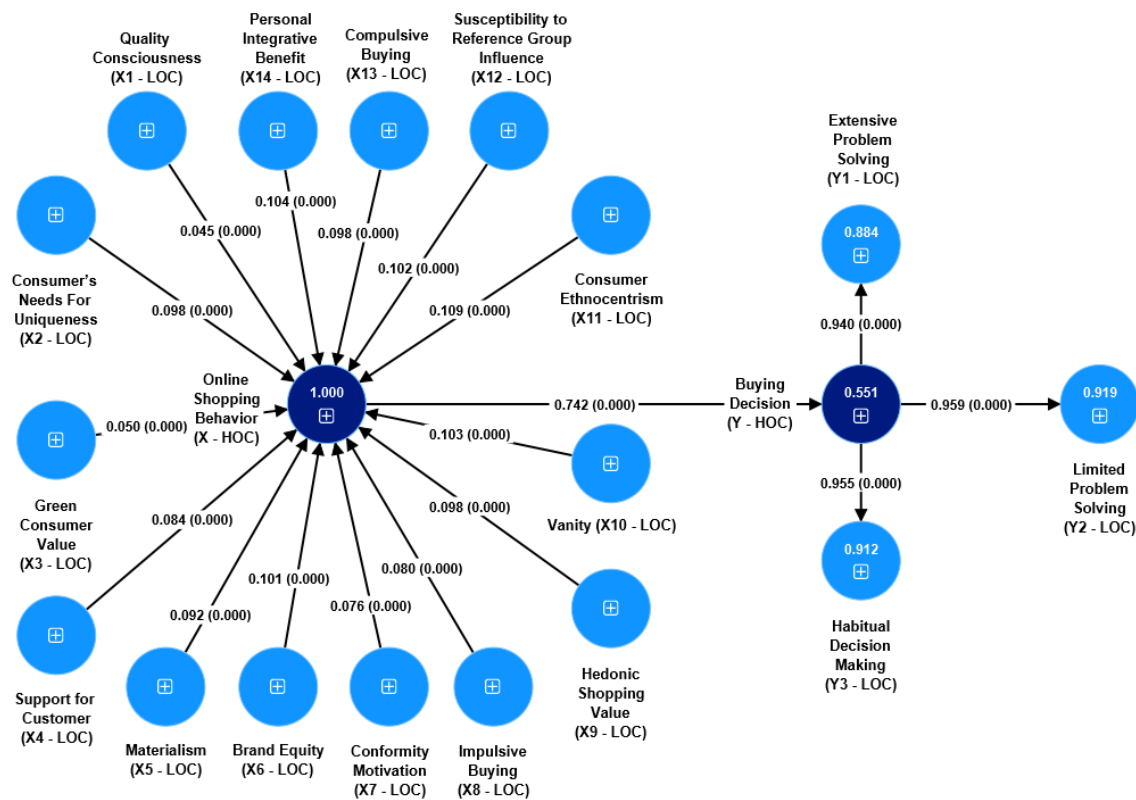


Figure 2. Bootstrapping Results of Main Model

When it comes to impulsive buying, characterized by spontaneous and unplanned purchases, also saw a shift in influence during the pandemic. Before the pandemic, impulsive buying tendencies did not significantly impact extensive problem-solving behaviors, as indicated by a p-value below 0.05. However, the pandemic introduced uncertainties that made impulsive tendencies more influential, with a path coefficient of 0.048 ($p = 0.000$) during this period. Similarly, limited problem-solving and habitual decision-making, previously unaffected by impulsive buying, showed path coefficients of 0.049 ($p = 0.000$) for both during the pandemic. These findings validated hypotheses H1h, H2h, and H3h, emphasizing the growing influence of impulsive buying on Gen Z's shopping behaviors amid global challenges.

The concept of brand equity, representing the value and strength a brand contributes to a product or service, emerged as another significant factor during the pandemic. Pre-pandemic, Gen Z's perception of brand equity had no notable impact on limited problem-solving behaviors ($p < 0.05$). However, during the pandemic, brand equity began influencing limited problem-solving decisions, with a path coefficient of 0.048 ($p = 0.000$). This finding led to the acceptance of hypothesis H2f, underscoring the increased role of brand equity in shaping Gen Z's decision-making processes during the pandemic.

Conclusion

This research aimed to answer two core questions: (RQ1) What factors influenced Generation Z's online shopping behaviour before the pandemic? and (RQ2) How have these factors evolved during the pandemic? By employing a Partial Least Squares - Multi-Group Analysis (PLS-MGA) framework and analysing the responses of Generation Z participants from two distinct time periods (2018 and 2022), this study identified significant shifts in decision-making styles—extensive, limited, and habitual—during the pandemic.

The findings demonstrated that external global events, such as the COVID-19 pandemic, significantly influenced internal consumer values, leading to behaviour transformations. Key factors like quality consciousness, green consumer value, and materialism, which had minimal influence on decision-making pre-pandemic, became prominent during the pandemic. For example, quality

consciousness emerged as a critical determinant across all decision-making styles, with statistically significant path coefficients (e.g., 0.063 for extensive problem-solving, $p=0.000$). Similarly, green consumer values became more impactful, aligning with heightened awareness of sustainability during crises. Additionally, materialism and impulsive buying tendencies gained prominence, reflecting shifts in emotional and practical priorities.

The study also highlighted the rising importance of customer support and brand equity in Gen Z's decision-making processes during the pandemic. Customer support gained significant influence in both routine and complex purchasing decisions, while brand equity underscored the growing reliance on trust and familiarity during uncertain times.

These findings emphasize the role of communication in shaping consumer behaviour. Businesses and marketers must effectively communicate quality, sustainability, and brand trustworthiness to resonate with the evolving values of Generation Z. The study contributes to communication scholarship by highlighting how global crises amplify the importance of strategic messaging in digital contexts, fostering a deeper understanding of how external factors reshape consumer priorities.

Ultimately, this research underscores the adaptability of Generation Z and their pivotal role in driving the digital economy, offering actionable insights for businesses aiming to engage this influential demographic during and beyond periods of crisis.

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