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Consumption Dynamics in Hard-Discount Retail Outlets: A Quantitative Case Study During the COVID-19 Era

Reda SAIB[1], My Abdelouhab SALAHDDINE[2]

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Abstract

Purpose: This research aims to contribute constructively to the ongoing discourse surrounding COVID-19 pandemic responses by examining consumption patterns of basic necessities and everyday consumer goods in the hard-discount retail stores, while taking into account the chronological evolution of measures applied throughout the pandemic year. **Research design and methodology:** Data were collected from five hard-discount retailers over a four-year period and processed using the Statistical Package for the Social Sciences (SPSS). The analysis was conducted in two phases: the first involved calculating basic statistics, while the second focused on testing the research hypotheses. **Results:** Despite the implemented relief measures, sales variations remained significant throughout the three quarters of the pandemic year. All categories experienced significant increases in the first quarter, most in the second quarter, and fewer in the third quarter. The household products category exhibited the greatest variation, while the beverage category was the least impacted by the pandemic**. Conclusions:** This study enhances the understanding of consumer behavior during the COVID-19 pandemic, providing valuable insights for retailers and supply chain professionals. By identifying demand variation patterns and their implications, businesses can improve their resilience and adaptability in future crises, leading to more effective strategies for managing consumer needs and expectations.

Keywords: Retailers, Shops, Logistics, Inventory, Procurement.

JEL Classification Code: L81, M30, M31, Q11.

1. Introduction

The retail sector has undergone significant transformation in recent years, largely driven by the global disruptions caused by the COVID-19 pandemic. This crisis not only posed a substantial threat to public health but also severely impacted economies worldwide (Donthu and Gustafsson, 2020). The pandemic has altered various facets of daily life, notably consumer purchasing behaviors, food consumption patterns, and perceptions of food safety (Altarrah et al., 2021). In response to the emergence of the virus, countries implemented a range of preventive measures and restrictions aimed at curbing its spread, with varying degrees of severity (Rossell et al., 2021; Phillipou et al., 2020). In the absence of effective treatments or vaccines, many individuals were advised to remain at home,

1 First Author. Researcher, Department of Management, National School of Business and Management (ENCG), Abdelmalek Essaadi University, Morocco. Email: reda.saib@etu.uae.ac.ma
2 Second Author. Professor, Department of Management, National School of Business and Management (ENCG), Abdelmalek Essaadi University, Morocco. Email: salahddine@uae.ac.ma

leading to a significant shift in consumer behavior (Brizi et al., 2021). Consequently, governments adopted strategies that ranged from complete lockdowns to partial economic restrictions (Kraemer et al., 2020).

The restrictions imposed by COVID-19 have had profound effects on both the economy and society, resulting in direct consequences for production, supply chain stability, and financial markets (Żurek et al., 2024). The slowdown or complete cessation of production and trade has intensified the urgency to meet the rising consumer demand. Numerous studies have investigated the pandemic's impact on business performance across various sectors, including manufacturing, healthcare, transportation, and finance (Irwansyah et al., 2023). Findings indicate that COVID-19 has had a statistically significant effect on business performance (Atayah et al., 2022; Golubeva, 2021; Guérin and Suntheim, 2021; Toumi et al., 2023; Zheng, 2022).

During the pandemic, particularly following the announcement of containment measures, there was a notable surge in demand for specific products. Essential goods, including food, beverages, toiletries, and cleaning supplies, experienced the most significant increases in demand. Understanding how consumers and households adapted their purchasing decisions and food consumption patterns in response to the pandemic is crucial (Bender et al., 2022). Additionally, analyzing sales trends for these essential and consumer products within the context of COVID-19 is vital, given the far-reaching implications for the global economy.

The Theory of Planned Behavior (TPB), which builds on established theories of consumer behavior and crisis management, posits that individual is driven by behavioral intentions, influenced by attitudes, subjective norms, and perceived behavioral control. Indeed, consumers' attitudes towards safety and health during the pandemic significantly influenced their purchasing decisions, leading to increased demand for essential goods (Ajzen, 1991). This shift in consumer behavior aligns with the findings that the pandemic altered purchasing patterns, as individuals prioritized health and safety in their decision-making processes.

Another pertinent framework is Maslow's Hierarchy of Needs, which suggests that individuals prioritize their needs based on a hierarchy, starting from basic physiological needs to self-actualization. The pandemic shifted consumer focus towards fulfilling basic needs, such as food and hygiene products, as safety and health became paramount (Maslow, 1943). This shift in priorities can explain the surge in demand for essential goods during the crisis, as consumers sought to secure their basic necessities in an uncertain environment.

Additionally, the Crisis Management Theory emphasizes the importance of effective communication and strategic responses during crises. Organizations that adapted their marketing strategies and supply chains in response to the pandemic were more likely to succeed (Coombs, 2007). This theory can help contextualize the performance of retailers, which thrived by offering value during economic uncertainty. The ability of these stores to respond effectively to changing consumer needs during the pandemic highlights the relevance of crisis management strategies in the retail sector.

This study specifically focuses on the retail sector, with an emphasis on hard-discount stores, which have experienced substantial fluctuations in demand due to their specialization in offering everyday consumer goods at lower prices. During this period, several factors contributed to the success of hard discount stores (Steenkamp and Sloot, 2019). Notably, rising product prices have compelled many middle-class families to seek more economical purchasing options to maintain their standard of living (Hunneman et al., 2021). As a result, these stores have become increasingly profitable, providing better value for money compared to traditional retailers (Chaudhuri, 2015).

The primary objective of this study is to gain a deeper understanding of the pandemic's impact on the sales of essential consumer goods. By examining products across various categories, this research aims to provide a comprehensive perspective on the effects of COVID-19, highlighting emerging trends and differences. This investigation builds upon previous studies that have explored the pandemic's influence on the performance of companies within the consumer goods sector (Grimmer, 2022; Hung et al., 2021; Irwansyah et al., 2023; Kao et al., 2023; Klöckner et al., 2023; Li et al., 2022; Lukman, 2022; Rapaccini et al., 2020; and Żurek et al., 2024). The findings confirm the overall impact of the pandemic on consumer goods, with an interesting observation that beverage companies appear to be less affected (Irwansyah et al., 2023).

This research contributes significantly to the existing literature in three key ways. First, it provides empirical evidence of the impact of COVID-19 on the demand for basic necessities and convenience goods. Second, the study offers a detailed and comprehensive analysis, integrating the chronological evolution of measures implemented throughout the pandemic year and examining each product category individually. Third, it explores the impact of COVID-19 on the retail sector within the Moroccan context, an area that remains underexplored, particularly concerning hard-discount stores. The results of this study hold valuable implications for both academia and practice, offering insights that can assist governments in formulating effective economic strategies and enabling businesses to develop adaptive strategies in the face of economic uncertainty.

2. Empirical Framework and Basic Processing

2.1. Overview of the Empirical Framework

The empirical study was conducted among a selection of hard-discount retailers in Casablanca, a city situated along the Atlantic coast of Morocco. The focus on this retail format stems from its emphasis on essential goods and everyday consumer products, and its commitment to offering added value through lower prices, which gained significant importance during the pandemic period. The research involved five stores operated by the same company, selected through a purposive sampling method to ensure that the selected retailers were representative of the hard-discount format, characterized by offering essential goods at lower prices. These stores are interconnected through a management system that provides real-time sales data, allowing for a comprehensive analysis of sales trends.

Each selected store specializes in essential consumer products, including food items, beverages, toiletries, and cleaning supplies, which are crucial for households, especially during the pandemic. The stores utilize a centralized management system that enables efficient inventory management and sales tracking, overseen by a dedicated department responsible for independently managing inventory replenishment for each store. The primary dataset comprises historical monthly sales figures for everyday consumer products, encompassing over 800 items over a four-year period (2019-2022). This dataset includes both known and actual sales values to ensure reliability and eliminate speculation or estimation. The data is homogeneous over time, with all values derived from a consistent calculation and statistical collection methodology. Sales data were initially collected in their raw form and subsequently processed prior to analysis, ensuring that the dataset is clean and ready for statistical evaluation. This methodological framework allows for a robust analysis of the impact of the COVID-19 pandemic on the sales of essential consumer goods within the hard-discount retail sector, providing valuable insights into consumer behavior and market trends during this unprecedented period.

In order to concentrate on products with actual sales data over a three-year period—specifically, the pandemic year (March 2020 to February 2021), the year preceding it (March 2019 to February 2020), and the year following (March 2021 to February 2022)—we transferred the historical sales data from the collection system to an Excel file. This file included a comprehensive list of products identified by their unique item codes, with each entry reflecting the total sales for each month. We excluded products introduced after March 2019 and those discontinued before February 2022, as their sales figures do not accurately represent consumer demand, which could distort our analysis. Ultimately, we retained only those products with a minimum sales history of three years, resulting in a refined database of 705 items.

The prices of the products studied remained generally stable over these years, with minimal fluctuations as a whole. In addition, promotional activities were infrequent, indicating that price reductions or special offers were not a common strategy used by retailers. This price stability, combined with the infrequency of promotional activity, underlines the resilience of the market and provides essential context for understanding consumer behavior and purchasing patterns in relation to the products examined.

To enhance the analysis of our primary data, we have classified products into six distinct categories corresponding to specific segments of the retail environment:

The Healthcare category includes a wide range of products designed to enhance personal hygiene and grooming, such as soaps, skin care products, oral care products, fragrances and hair care solutions. These offerings address various personal care needs, promoting hygiene for individuals of all ages.

The Confectionery category covers sweet products for pleasure and culinary use, including ready-to-eat desserts, baking ingredients, chocolates and various snacks. This category offers an assortment of products to cater to diverse tastes and preferences, making it a popular choice for consumers seeking sweet treats and snacks.

The Creamery category includes dairy products essential for cooking and consumption, such as butter, cheese, drinking yoghurts and fresh milk, as well as eggs for their nutritional value. Overall, it provides a diverse selection of products to meet various culinary needs and dietary preferences.

The Maintenance category includes products for home maintenance and hygiene, including cleaning products, personal hygiene items and pet care products. This category provides essential products that simplify daily life and promote a clean, organized living environment.

The Groceries category includes staple foods and kitchen ingredients essential for preparing meals: pulses, various flours, pasta, preserves and seasonings to stimulate culinary creativity. Overall, it provides essential products for everyday cooking.

The Beverages category includes a varied selection of drinks, including fruit juices, sparkling and still waters, as well as soft drinks, to satisfy every taste. In summary, it presents a varied assortment of beverages that enhance meals and quench thirst.

Thus, these classifications provide a comprehensive framework for understanding the different product offerings in the retail environment.

2.2. Graphical Representation and Core Statistics

The objective of graphically representing the data is to gain an initial, detailed understanding of consumer demand. The first step involves creating a graphical representation of the time series data, which allows for visual observation of trends, identification of anomalies such as peaks or troughs, and determine the general trend (Bourbonnais, 2001).

To enhance the clarity of the graphical visualizations, we apply transformations or filters to the raw data. This process helps to emphasize significant patterns while minimizing noise that may obscure underlying information. Among the various filtering techniques available, the moving average is the most commonly employed. By applying the moving average, we can smooth out fluctuations and highlight the general trend of the series, facilitating a more precise analysis of the underlying models (see Figure 1).

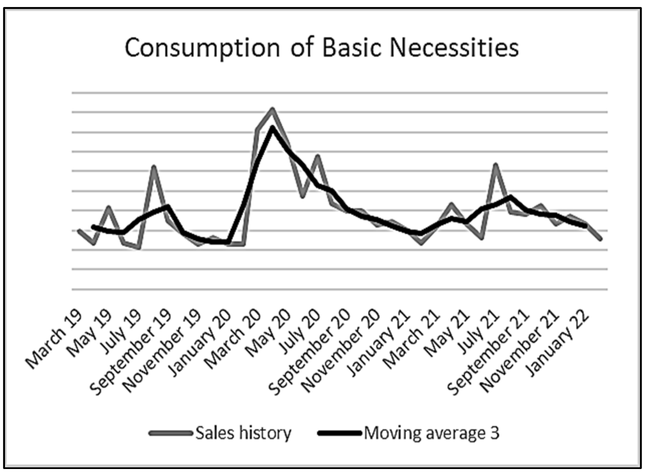

Figure 1: Sales History of Basic Necessities and Consumer Goods in Hard-Discount Stores.

Sales figures exhibit considerable month-to-month variability across each year, indicating fluctuations rather than a consistent linear trend. These fluctuations suggest the presence of seasonal trends; for instance, certain months may experience increased sales due to seasonal factors. Overall, demand across all categories remained relatively stable in 2019 and 2021, with a slight upward trend. In contrast, demand in 2020 was characterized by a significant increase, peaking in May of that year, followed by a decline before stabilizing towards the end of the year.

To draw more informed conclusions, we calculated basic statistics that provide insights into patterns, trends, and characteristics of the data, enabling us to make informed decisions and formulate hypotheses regarding demand. Specifically, on the basis of average annual sales calculated from total monthly consumption of all products in a category, we computed the coefficient of variation (see Table 1).

Table 1: Statistical Measure for Consumer Goods Categories

Measure	Categories	2019	2020	2021
Coefficient of Variation	Healthcare	0.12	0.20	0.11
	Confectionery	0.13	0.24	0.09
	Creamery	0.11	0.23	0.09
	Maintenance	0.10	0.25	0.12
	Grocery	0.15	0.36	0.13
	Beverage	0.45	0.36	0.32

The average sales value for 2020 was the highest among the three years, indicating that overall sales peaked during this period. Additionally, the coefficient of variation for 2020 was also the highest, reflecting the greatest relative variability in relation to the mean. A comparison of the coefficients of variation across each year and category reveals consistently high values for 2020 (March 2020 to February 2021) compared to 2019 (March 2019 to February 2020) and 2021 (March 2021 to February 2022), with the exception of the beverage category. This indicates that, while most categories experienced significant variability in sales during 2020, the beverage category exhibited a more stable performance relative to its average sales, suggesting differing consumer behaviors across product types during the pandemic.

3. Hypotheses and Empirical Results

3.1. Hypotheses Formulation

Our practical observations and preliminary analysis of basic sales statistics indicate an increase in fluctuations following the containment announcement. However, these observations remain unverified by statistical analysis. Therefore, we aim to rigorously assess whether the observed amplification of sales variation is statistically significant through a series of hypotheses and statistical tests. Specifically, we will evaluate whether sales figures from the pandemic year (2020) differ significantly from those of the preceding year (2019) and the subsequent year (2021).

- Impact of containment measures: A comparative analysis of sales across all categories during the pandemic year (2020) versus the preceding year (2019) and the subsequent year (2021).

In the first place, we assume that there was an amplification of the sales variation during the pandemic year (March 2020 to February 2021) compared with the previous year (March 2019 to February 2020) and the following year (March 2021 to February 2022). The literature indicates that the COVID-19 pandemic has had profound effects on consumer behavior and business operations, leading to significant changes in purchasing patterns (Donthu & Gustafsson, 2020; Grimmer, 2022). For instance, studies have shown that consumers shifted their focus towards essential goods, driven by heightened health concerns and changing priorities (Altarrah et al., 2021; Żurek et al., 2024). In the absence of events likely to have an impact on consumption, and based on our preliminary statistical analysis, demand for the years 2019 and 2021 is considered relatively stable. This allows us to formulate our first main hypothesis.

H1: Sales exhibit significant variation during the pandemic year 2020 in comparison to both the preceding year, 2019, and the subsequent year, 2021.

- *Impact of containment measures: A comparative analysis of sales across all categories in the first, second, and third quarters of 2020 compared to the corresponding quarters in 2019 and 2021.*

After a second analysis of the basic statistics, we noticed that the magnitude of sales increased after the announcement of containment and gradually decreased over time. The literature supports this observation, indicating that the initial months of the pandemic saw a surge in demand for essential goods as consumers prioritized their health and safety (Bender et al., 2022; Altarrah et al., 2021). With this in mind, we carried out a chronological analysis of key dates in the evolution of the pandemic. The containment decision was taken in March, while the alleviation measures were taken in July. It is therefore not surprising that the first four months following the containment announcement recorded greater amplification than the other months of the year. However, given the continuity of the restrictive measures and the lack of clarity regarding future decisions on further containment, we estimate that the variation of consumption may be significant over all periods. This brings us to our second hypothesis.

H2: Sales exhibit significant variation during the first, second, and third quarters of the pandemic year 2020 when compared to the corresponding quarters of the preceding year, 2019, and the subsequent year, 2021.

- *Impact of containment measures: A comparative analysis of sales based on each category in the first, second, and third quarters of 2020 versus the corresponding quarters in 2019 and 2021.*

In the following, we will examine each product category separately. The increase in demand certainly doesn't apply to all products, or at least not to the same degree. The literature indicates that different categories of goods experienced varying levels of demand fluctuation during the pandemic, influenced by consumer priorities and needs (Steenkamp and Sloot, 2019; Rabbi et al., 2021). For this reason, we divided our database into six categories: healthcare, confectionery, creamery, maintenance, grocery, and beverage. For some categories, the increase may be more visible than for others. Thus, we are interested in determining whether all categories experienced a significant variation in demand over the three quarters of the year, or whether the amplification depends on the product groups and the period studied.

According to our preliminary observations and analyses, we observed that, in general, products reflected an increase in demand in the first quarter, while in the second quarter, the amplification declined for some categories, and in the third quarter only a minority experienced a change in demand compared with the previous and the following year. This aligns with findings that consumer behavior shifted significantly during the pandemic, with essential goods seeing sustained demand while other categories fluctuated (Bender et al., 2022; Żurek et al., 2024). That leads us to our third set of hypotheses:

H3: In the first quarter of the pandemic year 2020, all categories exhibited a significant amplification of sales variation compared to the corresponding quarter of the preceding year, 2019, and the subsequent year, 2021.

H4: In the second quarter of the pandemic year 2020, at least half of the categories demonstrated a significant amplification of sales variation compared to the corresponding quarter of the preceding year, 2019, and the subsequent year, 2021.

H5: In the third quarter of the pandemic year 2020, a minority of categories recorded an amplification of sales variation compared to the corresponding quarter of the preceding year, 2019, and the subsequent year, 2021.

3.2. Statistical Tests

Our initial observations and analyses indicated that the pandemic year exhibited an increase in demand compared to both the preceding year and the subsequent year, particularly in the initial months. However, the hypotheses formulated in this study remain unconfirmed. In this section, we rigorously assess whether the observed amplification of sales variation is statistically significant, utilizing the Statistical Package for the Social Sciences (SPSS).

- *Impact of containment measures: A comparative analysis of sales across all categories during the pandemic year (2020) versus the preceding year (2019) and the subsequent year (2021).*

To determine whether the increase in sales variation is statistically significant, we employed a non-parametric sign test (Seigel, 1965). We defined an increase in sales variance

(2020 vs. 2019 and 2020 vs. 2021) as a success, while a decrease as a failure. The null hypothesis posits that there is no amplification, suggesting a success rate of 50% (Croson and Donohue, 2005).

Initially, we hypothesized that sales variation amplified during the pandemic year (March 2020 to February 2021) compared to both the previous year (March 2019 to February 2020) and the following year (March 2021 to February 2022). In the absence of significant events affecting consumption, our preliminary statistical analysis indicated that demand in 2019 and 2021 was relatively stable.

Comparing the first two years (2020 versus 2019), we found an 83.8% success rate for our first case, which is significantly different from 50% ($p < 0.001$). Our second case (2020 versus 2021) yielded a success rate of 82.3%, which is also significantly different from 50% ($p < 0.001$). The null hypothesis is rejected. The results support Hypothesis 1, confirming that demand increased in the pandemic year (March 2020 to February 2021) compared to both the previous year (March 2019 to February 2020) and the following year (March 2021 to February 2022).

To enhance the understanding of the practical significance of our findings, we included measures of effect size, such as Cohen's d. For the comparison between 2019 and 2020, Cohen's d was calculated as approximately 0.096, indicating a small effect size. For the comparison between 2020 and 2021, Cohen's d was calculated as approximately 0.057, indicating a negligible effect size.

- Impact of containment measures: A comparative analysis of sales across all categories in the first, second, and third quarters of 2020 compared to the corresponding quarters in 2019 and 2021.

We utilized a non-parametric Wilcoxon test to compare demand variation across the first, second, and third quarters of 2020 with the corresponding quarters in 2019 and 2021. Given the expectation that the announcement of containment measures would increase consumption, we used one-tailed tests for these comparisons (Croson and Donohue, 2005).

On the one hand, demand in the first quarter of 2020 has an average of 1,400.42, compared with 903.06 in the first quarter of 2019 and 947.65 in the first quarter of 2021. The announcement of the containment related to the pandemic seems to have an impact in absolute terms, especially as this increase is statistically significant compared with 2019 and 2021 ($n = 705$, $z = 19.20$, $p = 0.000$; $n = 705$, $z = 20.09$, $p = 0.000$). These results confirm that the first quarter of the pandemic year experienced an amplification of the sales variation compared to both the preceding and following years. The effect size for the comparison of 1st Quarter 2020 with 1st Quarter 2019, and 1st Quarter 2020 with 1st Quarter 2021 are calculated as 0.18 and 0.16, indicating a small effect.

On the other hand, the amplification of sales variation also appears to be well present in the second quarter of 2020. Indeed, the average demand per product following the containment announcement in the second quarter of 2020 is 1,107.85, which is statistically different from the average of 984.29 in the second quarter of 2019 ($n = 705$, $z = 11.13$, $p = 0.000$; effect size = 0.05) and is statistically different from the average of 1,088.56 in the second quarter of 2021 ($n = 705$, $z = 7.35$, $p = 0.000$; effect size = 0.01). We therefore conclude that sales have also increased significantly in the second quarter of 2020.

Similarly, the average demand per product in the third quarter of 2020 is 910.41, which is statistically different from the average of 837.19 in 2019 ($n = 705$, $z = 7.02$, $p = 0.000$, effect size = 0.03) and is statistically different from the average of 935.18 in 2021 ($n = 705$, $z = 4.89$, $p = 0.000$, effect size = -0.01). These results confirm that the third quarter of the pandemic year registered an amplification of the sales variation.

In terms of interpretation, the p-values reported (all less than 0.000) indicate a statistically significant increase in demand across all quarters compared to their respective years. A p-value of 0.000 suggests that the likelihood of observing such extreme data under the null hypothesis is exceedingly low, reinforcing the conclusion that the containment measures had a profound impact on consumer behavior during the early stages of the pandemic, confirming Hypothesis 2, which states that sales variation was amplified during all these periods.

- Impact of containment measures: A comparative analysis of sales based on each category in the first, second, and third quarters of 2020 versus the corresponding quarters in 2019 and 2021.

The previous analyses demonstrated a significant amplification of sales variation over the three quarters. We now examine each category over these quarters. Again, we employed a non-parametric Wilcoxon test to compare the sales variation in the first, second, and third quarters for each category: Healthcare, Confectionery, Creamery, Maintenance, Grocery, and Beverages.

- Category: Healthcare

Comparing the first four months of 2020 in the "Healthcare" category, we observe a significant amplification of demand variation compared to 2019 and 2021. The Wilcoxon test results indicate a p-value of 0.000 for both comparisons, suggesting strong statistical significance. The effect size, measured by Cohen's d, was calculated to be 0.4, indicating a medium effect. This suggests that the demand variation in 2020 was not only statistically significant but also practically meaningful, reflecting a substantial shift in consumer behavior during the pandemic (see Table 2).

Table 2: Statistical Details of the Healthcare Category.

Comparison	n	z	p-value	Cohen's d	Adjusted p-value
1st Quarter 2020 vs. 1st Quarter 2019	120	-7.659	0.000	0.40	0.000
1st Quarter 2020 vs. 1st Quarter 2021	120	-7.798	0.000	0.41	0.000
2nd Quarter 2020 vs. 2nd Quarter 2019	120	-4.055	0.000	0.17	0.000
2nd Quarter 2020 vs. 2nd Quarter 2021	120	-3.436	0.001	0.12	0.006
3rd Quarter 2020 vs. 3rd Quarter 2019	120	-4.177	0.000	0.14	0.000
3rd Quarter 2020 vs. 3rd Quarter 2021	120	-2.448	0.014	0.09	0.084

It is important to note that multiple comparisons were made across different categories and quarters. To address the potential inflation of Type I error rates, a Bonferroni correction was applied. In this case, all comparisons with original p-values of 0.000 remain significant after adjustment. However, while the comparison of the 2nd Quarter 2020 vs. 2nd Quarter 2021 is still significant with an adjusted p-value of 0.006, the comparison of the 3rd Quarter 2020 vs. 3rd Quarter 2021 is not significant at the conventional alpha level of 0.05 with an adjusted p-value of 0.084.

- Category: Confectionery

For the "Confectionery" category, we identify a significant amplification of sales during the first four months of 2020 compared to both 2019 and 2021, with p-values of 0.000 for both comparisons. The effect size, measured by Cohen's d, was calculated to be 0.41, indicating a medium effect. This suggests that the demand variation in 2020 was not only statistically significant but also had substantial implications for consumer purchasing behavior (see Table 3).

Table 3: Statistical Details of the Confectionery Category.

Comparison	n	z	p-value	Cohen's d	Adjusted p-value
1st Quarter 2020 vs. 1st Quarter 2019	188	-11.106	0.000	0.41	0.000
1st Quarter 2020 vs. 1st Quarter 2021	188	-10.934	0.000	0.32	0.000
2nd Quarter 2020 vs. 2nd Quarter 2019	188	-6.889	0.000	0.11	0.000
2nd Quarter 2020 vs. 2nd Quarter 2021	188	-3.523	0.000	-0.04	0.000
3rd Quarter 2020 vs. 3rd Quarter 2019	188	-6.213	0.000	0.09	0.000
3rd Quarter 2020 vs. 3rd Quarter 2021	188	-2.827	0.005	-0.05	0.030

All comparisons with original p-values of 0.000 remain significant after adjustment, while the comparison for the 3rd Quarter 2020 vs. 3rd Quarter 2021 is still significant with an adjusted p-value of 0.030, which is below the conventional alpha level of 0.05.

- Category: Creamery

Comparing the first two quarters of 2020 in the "Creamery" category, we observe a significant amplification of demand variation compared with both 2019 and 2021. The Wilcoxon test results indicate a p-value of 0.000 for the first quarter comparisons, suggesting strong statistical significance. The second quarter also shows significant results with p-values of 0.038 and 0.029 for comparisons with 2019 and 2021, respectively. However, the third quarter results show no significant difference when compared to 2019, with a p-value of 0.501 (see Table 4).

Table 4: Statistical Details of the Creamery Category.

Comparison	n	z	p-value	Cohen's d	Adjusted p-value
1st Quarter 2020 vs. 1st Quarter 2019	74	-7.227	0.000	0.36	0.000
1st Quarter 2020 vs. 1st Quarter 2021	74	-6.737	0.000	0.33	0.000
2nd Quarter 2020 vs. 2nd Quarter 2019	74	-2.079	0.038	0.09	0.076
2nd Quarter 2020 vs. 2nd Quarter 2021	74	-2.179	0.029	0.07	0.058
3rd Quarter 2020 vs. 3rd Quarter 2019	74	0.673	0.501	0.02	-
3rd Quarter 2020 vs. 3rd Quarter 2021	74	-2.217	0.027	0.02	0.054

The comparisons of the 1st Quarter 2020 vs. 1st Quarter 2019 and the 1st Quarter 2020 vs. 1st Quarter 2021 remain statistically significant after applying the Bonferroni correction, as their adjusted p-values are below 0.01. The other comparisons do not meet the adjusted significance level and are not considered statistically significant.

- Category: Maintenance

For the "Maintenance" category, we identify a significant increase in sales during the first two quarters of 2020 compared to both 2019 and 2021, with p-values of 0.000 for both comparisons. The results for the third quarter show no significant difference when compared to 2019 ($p = 0.239$), but there is a significant difference when compared to 2021 ($p = 0.030$) (see Table 5).

Table 5: Statistical Details of the Maintenance Category.

Comparison	n	z	p-value	Cohen's d	Adjusted p-value
1st Quarter 2020 vs. 1st Quarter 2019	100	-5.713	0.000	0.34	0.000
1st Quarter 2020 vs. 1st Quarter 2021	100	-7.561	0.000	0.36	0.000
2nd Quarter 2020 vs. 2nd Quarter 2019	100	-4.272	0.000	0.16	0.000
2nd Quarter 2020 vs. 2nd Quarter 2021	100	-4.485	0.000	0.10	0.000
3rd Quarter 2020 vs. 3rd Quarter 2019	100	-1.178	0.239	0.03	-
3rd Quarter 2020 vs. 3rd Quarter 2021	100	-2.177	0.030	0.03	0.180

All comparisons with original p-values of 0.000 remain significant after adjustment, while the comparison for the 3rd Quarter 2020 vs. 3rd Quarter 2019 is not significant, and the comparison for the 3rd Quarter 2020 vs. 3rd Quarter 2021 is not significant at the conventional alpha level of 0.05 with an adjusted p-value of 0.180.

- Category: Grocery

Comparing the first two quarters of 2020 in the "Grocery" category, we observe a significant amplification of sales variation compared with both 2019 and 2021. The Wilcoxon test results indicate a p-value of 0.000 for both comparisons in the first quarter, suggesting strong statistical significance. The second quarter also shows significant results with p-values of 0.000 and 0.013 for comparisons with 2019 and 2021, respectively. However, the results for the third quarter of 2020 compared to 2021 show no significant difference, with a p-value of 0.118 (see Table 6).

Table 6: Statistical Details of the Grocery Category.

Comparison	n	z	p-value	Cohen's d	Adjusted p-value
1st Quarter 2020 vs. 1st Quarter 2019	162	-9.815	0.000	0.14	0.000
1st Quarter 2020 vs. 1st Quarter 2021	162	-9.616	0.000	0.12	0.000
2nd Quarter 2020 vs. 2nd Quarter 2019	162	-5.805	0.000	0.03	0.000
2nd Quarter 2020 vs. 2nd Quarter 2021	162	-2.492	0.013	0.00	0.078
3rd Quarter 2020 vs. 3rd Quarter 2019	162	-2.695	0.007	0.03	0.042
3rd Quarter 2020 vs. 3rd Quarter 2021	162	-1.563	0.118	-0.01	-

In this case, all comparisons with original p-values of 0.000 remain significant after adjustment, while the comparison of 3rd Quarter 2020 with 3rd Quarter 2019 is still significant with an adjusted p-value of 0.042, which is below the conventional alpha level of 0.05. However, the comparison of 2nd Quarter 2020 with 2nd Quarter 2021 is not significant at the conventional alpha level of 0.05 with an adjusted p-value of 0.078.

- Category: Beverage

For the "Beverage" category, we note a significant amplification of demand variation in the first quarter compared with both 2019 and 2021, with p-values of 0.000 for both comparisons. However, the results for the second quarter show a significant difference when compared to 2019 (p = 0.001) but are not significant when compared to 2021 (p = 0.056). Additionally, the third quarter results show no significant differences compared to both 2019 and 2021 (see Table 7).

Table 7: Statistical Details of the Beverage Category.

Comparison	n	z	p-value	Cohen's d	Adjusted p-value
1st Quarter 2020 vs. 1st Quarter 2019	61	-2.905	0.004	0.06	0.024
1st Quarter 2020 vs. 1st Quarter 2021	61	-4.863	0.000	0.02	0.000
2nd Quarter 2020 vs. 2nd Quarter 2019	61	-3.441	0.001	0.05	0.006
2nd Quarter 2020 vs. 2nd Quarter 2021	61	-1.914	0.056	-0.04	-
3rd Quarter 2020 vs. 3rd Quarter 2019	61	-1.638	0.101	0.07	-
3rd Quarter 2020 vs. 3rd Quarter 2021	61	-0.272	0.785	-0.07	-

The first three comparisons remain statistically significant after applying the Bonferroni correction, as their adjusted p-values are below 0.05. The other comparisons do not meet the adjusted significance level and are not considered statistically significant. The results from the analysis of the six categories reveal significant trends in sales variation during the pandemic year, particularly in the context of the first three quarters of 2020.

Overall, in the first quarter of 2020, all six categories demonstrated a marked amplification of sales variation when compared to both 2019 and 2021. This finding strongly confirms Hypothesis 3, indicating that the onset of the pandemic led to a substantial increase in demand across all categories. The data suggests that consumer behavior shifted dramatically as individuals responded to the uncertainties and challenges posed by the pandemic, resulting in heightened demand for various products.

In the second quarter of 2020, three out of the six categories continued to show significant increases in sales variation compared to the previous year and the following year, thereby confirming Hypothesis 4. This indicates that the initial surge in demand persisted at least half of the categories as consumers adapted to the ongoing pandemic conditions. However, one category showed no significant difference compared to both years, highlighting that not all sectors experienced the same level of impact. Overall, we conclude that the second quarter saw a continuation of increased sales variation, reflecting sustained changes in consumer purchasing behavior.

In the third quarter of 2020, the trend shifted, with only one out of the six categories showing significant amplification in sales variation compared to the previous and following years, thus confirming Hypothesis 5. The majority of categories displayed non-significant differences during this quarter, suggesting a stabilization of consumer behavior as the initial pandemic-related panic subsided. This indicates that while some categories continued to thrive, many others returned to more typical demand patterns, reflecting a potential normalization in consumer purchasing as the year progressed.

4. Discussion and Conclusions

4.1. Discussion

The period from March 2020 to February 2021 witnessed a significant increase in demand variation for everyday consumer goods, compared to both the previous year (March 2019 to February 2020) and the subsequent year (March 2021 to February 2022). This surge in demand can be attributed to a series of stringent containment measures implemented during the early months of the pandemic, including bans on gatherings, the closure of educational institutions, suspension of air and sea travel, and the enforcement of health protocols such as mandatory mask-wearing. As anticipated, the first quarter of the pandemic year (March to June 2020) recorded the most pronounced increase in demand, reflecting the need for essential goods during a time of uncertainty.

The findings of this study align with the observations made by Donthu and Gustafsson (2020), who noted that the pandemic led to dramatic changes in consumer behavior and business operations across various sectors. The initial surge in demand for basic necessities can be seen as a direct response to the fear and uncertainty surrounding the pandemic, as consumers sought to stockpile essential items in anticipation of potential shortages. This behavior is further supported by Brizi et al. (2021), who found that individuals with a high need for closure tended to stockpile more food, indicating a psychological response to perceived scarcity.

The psychological impact of the pandemic played a crucial role in shaping consumer behavior. Fear and uncertainty drove individuals to engage in panic buying, as they sought to secure their basic needs in an unpredictable environment. This behavior reflects a broader psychological response to crises, where individuals attempt to regain a sense of control through stockpiling. Additionally, mental health concerns, as highlighted by Rossel et al. (2021), influenced purchasing decisions, with consumers prioritizing products that contributed to their safety and well-being.

Socioeconomic factors also significantly influenced consumer behavior during this period. The pandemic resulted in substantial economic challenges, including job losses and income reductions, which led consumers to become more cautious with their spending. The findings from Rabbi et al. (2021) indicate that food stress, driven by economic pressures, directly affected buying behavior, prompting consumers to prioritize essential goods over non-essential items.

Following the initial four months of strict containment, the gradual easing of restrictions in the second quarter (July to October 2020) led to a reduction in demand amplification, although it did not completely eliminate it. The reopening of restaurants, shopping centers, and public transport, along with the partial reopening of borders, contributed to a slight decline in demand compared to the first quarter. However, the lingering effects of the health emergency continued to influence consumer behavior, resulting in a return to more normalized demand levels by the final quarter of 2020, but with some residual variation. This observation is consistent with the findings of Żurek et al. (2024), who highlighted that evolving consumer needs and expectations during the pandemic significantly altered the supply and demand dynamics for various goods and services.

The analysis further revealed that the amplification of sales variation was not uniform across product categories. Consistent with our findings, the first quarter exhibited the highest demand variation across all categories, while the second quarter showed a decrease in variability. By the third quarter, demand stabilized, with only minor fluctuations observed. Notably, the "Maintenance" category, which includes essential cleaning products such as disinfectants and surface cleaners, experienced the most significant amplification in demand during the first quarter. The importance of these products is further emphasized by the findings of Altarrah et al. (2021), who noted that public health measures during the pandemic significantly influenced food purchasing behaviors and consumer perceptions of safety.

Interestingly, while the "Maintenance" category saw the strongest initial demand surge, the "Healthcare" category maintained elevated demand levels for a more extended period. This sustained demand can be attributed to the ongoing need for healthcare-related products, which remained critical as the pandemic persisted despite the easing of restrictions. The continuous threat of COVID-19 ensured that consumers remained vigilant, leading to sustained purchases of items that promote health and safety.

This is supported by Rossel et al. (2021), who found that mental health concerns during the pandemic were prevalent, indicating that consumers were likely to prioritize products that contributed to their well-being.

In contrast, the "Beverage" category was the least affected by the pandemic, reflecting a shift in consumer priorities during times of crisis. This result was also observed by Irwansyah et al. (2023). Moreover, this observation is consistent with findings from other studies that suggest essential goods, particularly those related to health and hygiene, experienced greater demand fluctuations compared to non-essential items (Zheng, 2022; Guérin & Suntheim, 2021). The relatively stable demand for beverages may indicate that consumers were more focused on securing essential items that directly impacted their health and safety.

On the other hand, the economic landscape during the pandemic in Morocco was characterized by a dependence on informal employment, which left many individuals vulnerable to income shocks. Following the implementation of various measures, including a state of emergency and containment, economic activity was significantly impacted. However, the introduction of financial assistance programs to support vulnerable populations have influenced consumer behavior by providing a safety net for essential purchases (World Bank, 2020; UNDP, 2020). Culturally, Moroccan consumers have a strong emphasis on family and community, which may have driven the desire to stockpile essential goods to ensure the well-being of relatives.

Comparing Morocco's experience with other geographic contexts reveals both similarities and differences in consumer behavior during the pandemic. In countries like Italy and Spain, where the pandemic's impact was initially severe, consumers exhibited similar panic buying behaviors, particularly for food and hygiene products. However, the recovery trajectory varied; while Morocco experienced a gradual easing of restrictions, countries like New Zealand implemented swift and effective containment measures that allowed for quicker normalization of consumer behavior (Cousins, 2020).

4.2. Conclusions

This study provides a comprehensive analysis of the impact of the COVID-19 pandemic on the demand variation of everyday consumer goods in Morocco, particularly within the hard-discount retail sector. Our preliminary analyses indicated a significant increase in sales variation during the pandemic year of 2020, confirming that the announcement of restrictive measures led to notable oscillations in sales compared to both the preceding and following years. The statistical evidence demonstrated that, following the implementation of containment measures in March 2020, there was a marked increase in demand variation that persisted throughout the year across all three quarters.

The chronological analysis of key dates revealed that the most substantial demand amplification occurred in the initial months of the pandemic, coinciding with the strictest containment measures. As restrictions were gradually alleviated in July, demand variations began to stabilize, yet the effects of the pandemic continued to influence consumer behavior. Our findings indicated that while all product categories experienced significant demand increases in the first quarter, the extent of this variation varied across categories in subsequent quarters. Notably, the "Maintenance" and "Healthcare" categories exhibited the most pronounced demand fluctuations, reflecting the heightened consumer focus on hygiene and health during the pandemic.

This study offers several new insights that extend beyond existing literature. Firstly, the Moroccan context reveals unique cultural factors that influenced consumer behavior, such as the strong emphasis on family and community. This cultural lens may have driven consumers to stockpile essential goods not only for personal use but also to support extended family members, a behavior that may differ from individualistic cultures.

Secondly, the reliance on informal employment in Morocco created a distinct economic environment that shaped consumer responses. Many Moroccan consumers faced significant economic uncertainty, leading them to adopt a more cautious approach to spending, with a pronounced focus on essential goods. This trend may not be as evident in other regions where consumers had more disposable income to spend on non-essential items.

Additionally, the study highlights the role of local retailers in adapting to consumer needs during the pandemic. Indeed, Moroccan hard-discount retailers demonstrated agility in adjusting their product offerings strategies to align with evolving consumer preferences. This adaptability may serve as a model for other markets, where local businesses can leverage their understanding of community needs to enhance resilience during crises.

The implications of these findings are significant for retailers and supply chain managers. Understanding the dynamics of demand variation during crises can inform inventory management strategies and marketing approaches, ensuring that businesses are better equipped to respond to sudden shifts in consumer behavior. Moreover, the study highlights the necessity for retailers to adapt their offerings based on the evolving needs of consumers, particularly in times of uncertainty.

However, this research is not without limitations. The focus on basic necessities and everyday consumer products suggests that future studies could expand to include a broader range of product types to assess whether similar demand variations occur across different categories. Additionally, while this study is grounded in the Moroccan context, it would be valuable to conduct comparative analyses in other countries that experienced varying timelines and types of containment measures. Such research could provide deeper insights into the global implications of the pandemic on consumer behavior.

Furthermore, this study primarily examines demand variations from the retailer's perspective. Future research should explore the impact of these fluctuations on suppliers and the entire supply chain. As demand increases, the initial variations can lead to excess inventory, higher costs, and reduced efficiency, underscoring the importance of effective demand forecasting and supply chain management.

Finally, this study contributes to a broader understanding of consumer behavior during the COVID-19 pandemic and offers valuable insights for retailers and supply chain professionals. By recognizing the patterns of demand variation and their implications, businesses can enhance their resilience and adaptability in the face of future crises, ultimately leading to more effective strategies in managing consumer needs and expectations.

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