EFFECTS OF MOVEMENT RESTRICTIONS ON CONSUMER CONSUMPTION

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ABSTRACT
This study addresses the impact of movement restrictions, particularly during pandemics, on global consumer behavior, with a focus on grocery shopping. Despite the widespread effects, research on these changes remains limited, prompting the need to investigate hidden purchase patterns contributing to economic growth. Employing secondary data analysis, the study explores the effects of movement restrictions on customer consumption patterns, using K-means cluster analysis to identify distinct consumer segments. The findings highlight significant impacts on purchasing power, item prices, and consumption behavior, with a notable increase in item prices during the post-restriction period followed by a subsequent decline influenced by economic factors such as financial uncertainty and shifting priorities. This research contributes by shedding light on the dynamic nature of consumer behavior during and after movement restrictions, offering valuable insights for policymakers and businesses navigating the post-restriction economic landscape and informing strategies for economic recovery and growth.
Keywords: Movement Restriction, Consumer Consumption, K-means Clustering, Purchase Pattern.

1. Introduction

The global economy has endured unprecedented shifts in consumer behavior due to a variety of movement restrictions, including communicable diseases, natural calamities, wars, curfews, and political instability. Encompassing the pre-restriction, restriction, and post-restriction phases prompted by the COVID-19 pandemic, this study focuses on grocery shopping behavior utilizing a chain supermarket database.

Consumer behavior has been significantly affected by various crises throughout history. Previous studies have highlighted the changes in consumer patterns during events like the SARS outbreak, Hurricane Katrina, and the financial crisis of 2008 (Baekkeskov, 2020) (Ganguly, 2020) (Hall, 2020). However, the COVID-19 pandemic, with its global scale and extended duration, presents a unique context for studying consumer behavior. The pandemic has not only led to immediate shifts in shopping habits but also long-term shifts in consumer priorities and spending patterns (Zwanka, 2021) (Sheth, 2020). The necessity to understand these shifts is critical for businesses and policymakers to adapt to new consumer realities.

While there is considerable research on consumer behavior during crises, gaps remain in understanding the specific changes in grocery shopping behavior during and after movement restrictions. Most existing studies focus on short-term impacts and do not address the sustained changes in consumer behavior post-crisis (Donthu, 2020) (Kirk, 2020). Additionally, there is limited research on the comparative impact of different types of movement restrictions, such as those caused by natural disasters versus pandemics or political instability (Roggeveen, 2020). This gap limits the ability of businesses and policymakers to develop effective strategies for economic recovery and growth in the aftermath of such events. This study aims to fill these gaps by providing a comprehensive analysis of consumer behavior across different phases of movement restrictions using a robust dataset spanning five years. By employing k-means clustering and explorative data analysis, this research seeks to uncover hidden purchase patterns and provide insights that can inform policy decisions and business strategies. There is a lack of research focusing on the behavior of specific demographic groups, such as different age

brackets, income levels, and regions. Chen, Di and Wang (Chen, 2023) underscore the importance of demographic-specific studies to gain more nuanced insights into consumer behavior changes. Furthermore, longitudinal studies are necessary to capture the sustained shifts in shopping habits post-pandemic, as highlighted by Donthu and Gustafsson (Donthu, 2020). Additionally, there is a need for industry-specific research to understand the pandemic's impact on various sectors, such as the food, clothing, and grocery industries. Finally, existing studies often focus on specific geographic regions or countries, leaving a gap in our understanding of cross-cultural differences in consumer behavior during crises. Cross-cultural research is essential to developing a comprehensive global perspective on these behavioral changes.

The primary goal of this research is to scrutinize the effects of movement restrictions on customer consumption patterns, striving to comprehend the enduring impact on purchase behaviors, imported item consumption, and group-specific purchasing trends. Through an extensive data analysis process, including sorting, price graph analysis, consumption pattern assessment, visitation and expenditure pattern analysis, and an exploration of imported item consumption patterns, the study endeavors to unravel significant shifts in customer behavior within the confines of movement limitations. The remainder of the paper is structured as follows: Section 2 comprises a literature review, examining different works on movement restriction and customer segmentation techniques and highlighting the limitations of existing works. The methodology is described in Section 3, the detailed result of the work is highlighted in Section 4, and the paper is concluded in Section 5.

2. Literature Review

The restrictions imposed on people because of the COVID19 pandemic have caused a significant impact on our economy and have resulted in significant changes in customer behavior.

Numerous research studies have examined the effects of the movement restrictions caused by COVID-19 pandemic on various aspects of food consumption and related areas. These studies have elucidated factors such as changes in food patterns, food quality, food safety concerns, food insecurity, changes in food demand, food prices, as well as the functioning of global and public food supply chains (Gutiérrez-Villar, 2021). Through comprehensive investigations, these studies have provided valuable insights into the response to movement restrictions in the food sector and contributed to our understanding of the challenges and adaptations within this domain (Arouna, 2020). For instance, Sheth (Sheth, 2020) discusses how the COVID-19 pandemic induced a rapid shift towards online shopping and stockpiling behaviors as consumers reacted to uncertainties and supply chain disruptions. Similarly, Zwanka and Buff (Zwanka, 2021) emphasize the shift in consumer priorities towards essential goods and services, with a marked decline in discretionary spending. The grocery sector has experienced significant changes in consumer behavior due to movement restrictions. Aday (Aday, 2020) examined the impact on food supply chains and consumer purchasing patterns, noting an increase in bulk buying and a preference for non-perishable goods during lockdown periods. This behavior is corroborated by Grashuis, Skevas, and Segovia (Grashuis, 2020), who found that consumers exhibited panic buying tendencies, leading to temporary shortages and increased prices for essential items.

A large number of studies have focused on examining the impact of the pandemic on individual-level consumer purchasing patterns. These studies delve into various aspects, including changes in shopping patterns, shifts in local brand preferences, alterations in product choices, modifications in online shopping behavior, and adjustments in consumer decision-making processes. By investigating these dimensions, these studies shed light on the transformative effects of the pandemic on consumer behavior and provide valuable insights for businesses and policymakers seeking to understand and respond to these shifts (Goddard, 2020) (Silva, 2021). COVID-19 has had major changes in consumer behavior, particularly in choices of purchase channels. Businesses were forced to change their business models to meet the changing needs and expectations of customers. Understanding and responding to growing consumer demand is critical in the wake of the COVID-19 pandemic (Gracia, 2014). While initial studies focused on immediate responses, there is growing interest in understanding the

long-term behavioral shifts induced by the pandemic. Donthu and Gustafsson (Donthu, 2020) argue that the pandemic has accelerated pre-existing trends towards e-commerce and digital transactions, suggesting that these changes may become permanent. Similarly, Hall et al. (Hall, 2020) explore how prolonged movement restrictions have redefined consumer expectations and behaviors, particularly in terms of convenience and safety.

Purchasing opinions play a substantial role in shaping consumer behavior. The formation of coping opinions by consumers is an intricate process influenced by multiple factors, shaping consumer behavior (Kotler, 2010). One of the factors that consumers take into consideration during the purchasing process is the location or venue of their purchase (Wierzbiński B, 2021). The process of selecting a purchasing location is equally fascinating and intricate, mirroring the complexity involved in choosing a specific product. The impact of movement restrictions on consumer behavior also varies across different cultural and geographic contexts. Roggeveen and Sethuraman (Roggeveen, 2020) highlight that while Western countries experienced a surge in online shopping, some Asian markets saw a quicker return to traditional shopping methods post-lockdown. This suggests that cultural factors play a significant role in shaping consumer responses to crises.

Consumer behavior underwent significant changes as a result of the pandemic's impact (Das, 2022). Previous studies have indicated a shift in consumer attitudes towards brands and their purchasing channels, with buyers now evaluating companies from a fresh perspective (Arora, 2020). Recent literature suggests that consumers experienced product shortages and exhibited food-hoarding behavior, leading to significant changes in their daily shopping habits (Pantano, 2020) (Jeżewska-Zychowicz M, 2020). Consumers were particularly concerned about the limited access to food, which heightened their tendency to purchase larger quantities. Additionally, there has been a notable shift in consumer channel preferences, with an increased demand for essential purchasing channels that allow them to fulfill their needs efficiently and safely (Nanda, 2021) (Shamim, 2021). Digital modes of purchasing have become a popular means for acquiring products (Petrescu-Mag, 2020) (Amberg, 2019) (Gao, 2020). There is a strong association between the increase in confirmed COVID-19 cases and the growing inclination of consumers to purchase food online. As a result, online shopping has expanded to encompass a wide range of products that were previously not readily accessible to digital consumers (Lu, 2022). The COVID-19 pandemic compelled older consumers and those residing in rural areas to embrace online shopping as a necessity. The limitations and risks associated with in-person shopping prompted these demographic groups to explore and adopt digital platforms for their shopping needs (Pantano, 2020).

Various methodological approaches have been employed to study these shifts in consumer behavior. K-means clustering and other data mining techniques have been particularly useful in segmenting consumer groups based on their purchasing patterns during the pandemic (Christy, 2021) (Anitha, 2022) (Wu, 2020). These methods provide a nuanced understanding of how different consumer segments have adapted to the changing landscape. Retailers can better understand their customers and target particular groups of customers by using the detailed information that clustered groupings provide about the adaptive patterns of the industry's consumers (Hartono, 2021) (Bargoni, 2022) (John, 2023).

A thorough selection process was used to perform this literature review, which included a systematic search of recent journal papers on well-known international databases. Assuring the adequacy of the comprehensive review, the review covers various aspects of the study, such as the impact of movement restrictions on consumer behavior, changes in grocery shopping patterns, behavioral shifts, the impact of cross-cultural differences, industry-specific behavior, and methodological approaches to customer segmentation.

3. Research Methods

The collected data went through a comprehensive data analysis process, which is shown in Fig. 1. The figure outlines the flow of data from data collection to clustering into multiple customer groups. Purposive sampling is applied after collecting the dataset to ensure diversity in the analysis. After selecting relevant features, the dataset goes through an exploratory data analysis, where patterns and behaviors of the consumers are gained. K-means clustering is

applied to the dataset after successfully selecting the optimal number of clusters using the Elbow method. Finally, the clusters are interpreted to gain insights about different customer groups.

Data Collection and Sampling

The data for this study were collected from a chain grocery shop database in Bangladesh over a comprehensive five-year period, from March 2018 to February 2023. This timeframe was chosen to encompass the pre-restriction, restriction, and post-restriction phases prompted by the COVID-19 pandemic. This extensive data collection period ensures a thorough understanding of consumer behavior changes over time. The dataset contains information including: Invoice Number, Area, Item Category, Item Sub-Category, Member Identification, Member Name, Mobile Number, Invoice Date, Item Code, Purchase Quantity, Purchase Value, Invoice Time, Product Type (imported or local), and Income Range. The data were categorized according to various time periods, product categories, and client membership types. The total number of raw data points found was 3,80,47,847. After filtering, the workable data is 1,67,09,894, which is 43.9% of the main data. The chain grocery shop database in Bangladesh was chosen for its comprehensive view of consumer behavior changes over time, which is essential for analyzing the impact of movement restrictions on grocery shopping patterns. The dataset's richness, including detailed purchase quantities, values, item categories, and customer demographics, allows for in-depth analysis. Bangladesh's diverse population and economic dynamics provide a valuable context for studying consumer behavior under movement restrictions. The data, representative of urban and semi-urban areas, offers insights into a wide range of consumer segments. Participants' characteristics include demographics, shopping behavior, and membership information.

A subset of the dataset was selected using purposive sampling, which involves deliberately selecting samples that represent specific characteristics or groups of interest. The criteria for selecting this subset included targeting specific customer segments based on income levels, geographic regions, and shopping frequency. Ensuring representation across the pre-restriction, restriction, and post-restriction periods was also a priority to capture changes over time. The rationale behind purposive sampling is to ensure that the selected subset accurately represents the diverse customer base and captures variations in behavior across different segments and time periods. This approach enhances the study's ability to draw meaningful insights and conclusions.
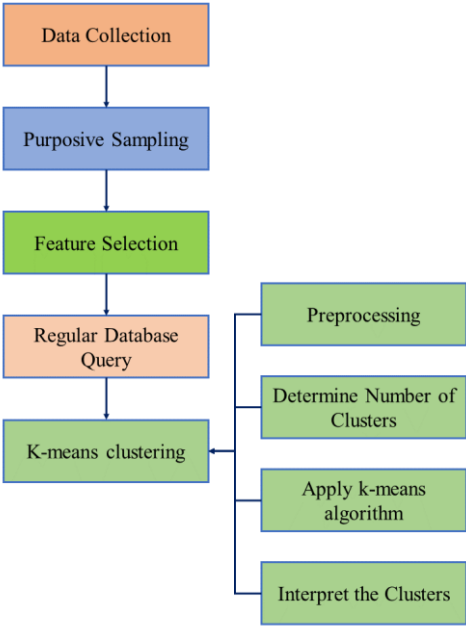

Fig. 1. Work Flow Model

Preprocessing

The data were cleaned and preprocessed by removing any irrelevant or missing values and normalizing numerical variables. The categorical, area, and income group variables were also converted into numerical representations using one-hot encoding technique.

Processing Methods

Two techniques were utilized for the research. Those techniques are explained as follows:

i. Exploratory Data Analysis: In this process, a regular database query was used to find out the price comparison, customer's consumption pattern, customer footfall, imported item consumption and the overall customer purchase pattern in the period before restriction, restriction time, and post-restriction. This method was conducted to uncover initial insights and identify patterns in the data.

ii. K-means Clustering: K-means clustering is a widely employed unsupervised machine learning algorithm that facilitates the grouping or clustering of data based on their similarities. While investigating the influence of movement restrictions on customer consumption patterns, k-means clustering becomes a valuable analytical tool used by many researchers (Ong, 2023) (Tabianan, 2022). K-means clustering was selected for its ability to efficiently handle large datasets and reveal hidden patterns within the data. This method helps in understanding how different customer segments responded to movement restrictions, providing valuable insights for targeted policy-making and business strategies.

In processing the dataset using the K-means clustering algorithm, several key steps were followed. Initially, a feature selection phase involved the identification of relevant characteristics that might be affected by the restriction. The focus was on variables such as frequency of purchase, amount of spending on specific product categories, income groups in the area, or changes in customer behavior. The following features were selected for our analysis: Income Group, Area, Item Category, Number of Bills, Number of Days Purchase, Number of Item Purchases, Purchase Quantity, Purchase Value, and Basket Value. Subsequently, the number of clusters was determined using the Elbow Method, with 5 selected as the optimal value for K. Finally, the K-means clustering algorithm was applied with respect to selected features to categorize the data into the specified number of clusters.

4. Results and Discussions

Exploratory Data Analysis

Price Graph Analysis: Dynamic price graphs, influenced by factors like supply, demand, market conditions, and economic indicators, reflect changes in consumption patterns during the pandemic-induced movement restrictions. This visual representation aids businesses, economists, and policymakers in assessing the specific effects on customer behavior and making informed decisions. Equation (1) was used to calculate the average product price.

$$Average\ Price = \frac{\sum Purchase\ Value}{\sum Purchase\ Quantity} \tag{1}$$

Price increase percentage and inflation, though related, differ in their scope. The former denotes the change in price percent between two periods, termed as the price change percentage. On the other hand, inflation signifies the general increase in prices across a diverse range of goods and services in an economy. Analyzing Table 1, the study found that prices were not controlled during the restriction period and post-restriction period, where inflation was less than the price index (MacroTrends).

Table 1 - Product Price and Inflation Rate

Year	Average Price	Price Shift (%)	Inflation Rate (%)	Difference
2018	107.65		5.64	
2019	109.86	2.05	5.69	-3.64
2020	115.41	5.06	5.69	-0.63
2021	129.01	11.78	5.55	6.23

2022	140.22	8.69	6.15	2.54
2023	153.91	9.76	8.70	1.06

The adverse relationship between the price shifting and the inflation rate can also be inferred from Fig. 2. The implications of a higher price increase rate compared to inflation encompass decreased purchasing power, leading to reduced discretionary spending and potential declines in overall customer demand. Additionally, it may result in lower savings, an increased cost of living, and the potential for an inflationary spiral. Such circumstances can contribute to economic instability when prices rise at a faster rate than inflation.
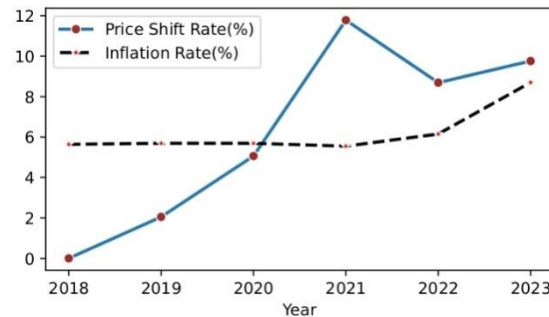

Fig. 2. Comparison Between Price Shift and Inflation Rate

Customer's Consumption Analysis: The pandemic-induced movement restrictions led customers to prioritize specific items, influencing consumption patterns and creating shifts in demand for certain products. Equation (2), (3) and (4) were used to find Quantity Per Bill (QPB), Item Per Bill (IPB) and Basket Value respectively.

$$QPB = \frac{\sum Purchase\ Quantity}{\sum Number\ of\ Bill} \tag{2}$$

$$IPB = \frac{\sum Number\ of\ Items}{\sum Number\ of\ Bill} \tag{3}$$

$$Basket\ Value = \frac{\sum Purchase\ Value}{\sum Number\ of\ Bill} \tag{4}$$

Table 2 - Analysis of Items per Bill, Quantity per Bill and Basket Value

Year	IPB	IPB Shift Rate (%)	QPB	QPB Shift Rate (%)	Basket Value
2018	8.36		13.13		1413.14
2019	7.60	-9.09	11.81	-10.05	1297.56
2020	8.53	12.24	14.49	22.69	1672.24
2021	7.68	-9.96	12.25	-15.46	1581.02
2022	7.15	-6.90	11.15	-8.98	1562.85
2023	6.81	-4.76	10.35	-7.17	1593.02

Table 2 shows that in the first year of the restriction period, customers consumed more quantities and more items. They also spent more on basket value. In the first year of restriction, the price increase percentage and inflation rate are mostly similar for this chain grocery shop in Bangladesh. Another finding of the above analysis is that customers decreased the purchase quantity as well as the number of items in the basket at the end of the restriction period. Considering the inflation rate, it was also found that the customer basket value also decreased.
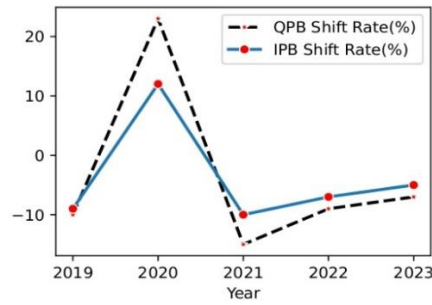
Fig. 3. Quantity per Bill and Item per Bill

Fig. 3 reveals that there was an increase in purchases at the start of the restriction, particularly of non-essential items. In the post-restriction period, consumers narrowed down their item selection due to financial uncertainty and shifting priorities, concentrating on essential goods. This reduction in item range and quantity reflects changing consumer behaviors influenced by economic concerns.

Customer Footfall and Visitation Pattern Analysis: Analyzing customer visitation patterns enables businesses to identify any shifts in the frequency, duration, or timing of customer visits. This helps in adapting marketing strategies, adjusting operating hours, and tailoring offerings to meet changing customer demands. Equation (5) was used to find the customer footfall.

$$Customer\ Footfall = \frac{\sum Number\ of\ Bills}{\sum Number\ of\ Days} \tag{5}$$

Fig. 4 exhibits that consumer behavior underwent significant changes during and after the restriction period, marked by a shift towards essential purchases and reduced discretionary spending. Decreased footfall may lead to lower sales and revenue, impacting the grocery shop's profitability. The reduction in footfall also poses challenges such as slower inventory turnover, potentially resulting in issues like expired goods and increased storage costs. Lower customer footfall means less cash coming into the business. This can create cash flow problems, making it difficult for the grocery shop to meet its financial obligations, such as paying suppliers, employees, or rent.
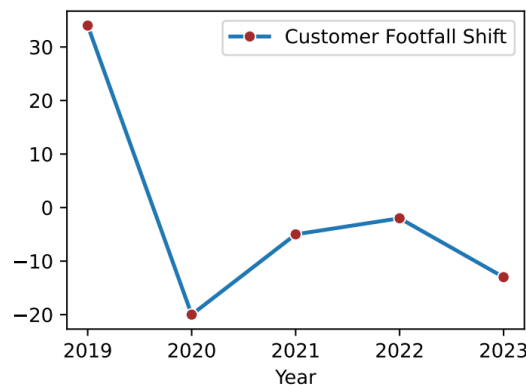

Fig. 4. Average Customer Footfall

Expenditure Pattern and Category Contribution Analysis: Category-wise customer expenditure patterns reflect how customers distribute their spending among various categories. This analysis provides valuable insights into consumer preferences, purchasing habits, and overall spending behavior. Category contribution analysis evaluates the performance and impact of different product categories on overall business revenue and profitability. This aids

businesses in identifying the most profitable categories, allocating resources efficiently, and making informed decisions regarding product assortment, pricing, and marketing efforts.
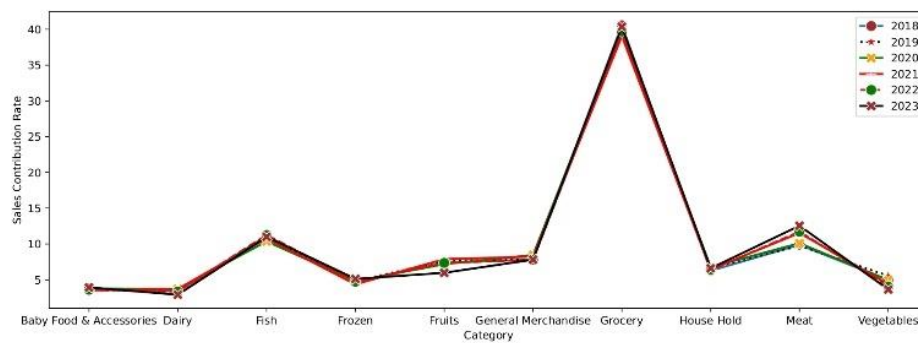

Fig. 5. Category-wise Sales Contribution

It can be deduced from Fig. 5 that there is no significant change in category-wise contribution, but on the other hand, in most cases, sales volume has decreased. These results justify previous analyses where customers purchased low quantities and decreased item numbers. Customers might have reduced purchase frequency to manage expenses more prudently, opting for alternative, more budget-friendly items.

Imported Item Consumption Pattern: Disruptions in supply chains, trade restrictions, and economic challenges during and after the restriction period influenced the sales of imported goods. These factors affected availability, demand, and pricing, with consumers prioritizing essential purchases over discretionary spending. Table 3 reveals that, except for 2019, Item per day, Purchase value per day, and quantity per day showed significant degrowth every year. It means the customer decreased their purchase pattern for imported items. From the previous analysis, "Customer expenditure patterns and Category contribution analysis," we found no significant change in category-wise sales contribution. From these two analyses, we assume that customers were looking forward to similar local products.

Table 3 - Imported Item Consumption Shift

Year	Customer per Day(%)	Item per Day(%)	Value per Day(%)	Quantity per Day(%)
2019	33.05	32.67	21.29	54.52
2020	-11.52	-12.87	2.91	-5.75
2021	-25.68	-27.38	-24.09	-29.92
2022	-20.09	-22.94	-22.89	-26.21
2023	-23.6	-27.72	-12.24	-40.28

K-Means Clustering Analysis

Defining the Clusters: The five clusters, generated through the application of the k-means clustering algorithm, have different attributes, where cluster - 0 consists of customers with an average purchase value from all areas and income groups. Including an increasing purchase value, cluster - 1 consists of high-income consumers from Dhanmondi and Uttara areas. With a consistently high purchase value, cluster - 2 is composed of high-income individuals from the Dhanmondi area. Cluster - 3 is composed of both high-income and mid-income individuals from all areas. Moreover, cluster - 4 consists of individuals from all income groups and areas.

Cluster-wise Purchase Patterns: The analysis of

Fig. 6 reveals distinctive patterns in the growth of consumers' purchase volume across clusters during and after the restriction periods. Cluster - 1 exhibited a substantial increase, experiencing an 83% growth during restrictions and an additional 8% post-restriction. In contrast, cluster - 0 witnessed a decline, with a 13% decrease during restrictions and a further 22% decline after the restriction. Lastly, cluster - 4 displayed notable growth, with an 11% increase during restrictions, but encountered a subsequent decline of up to 16% after the restriction.
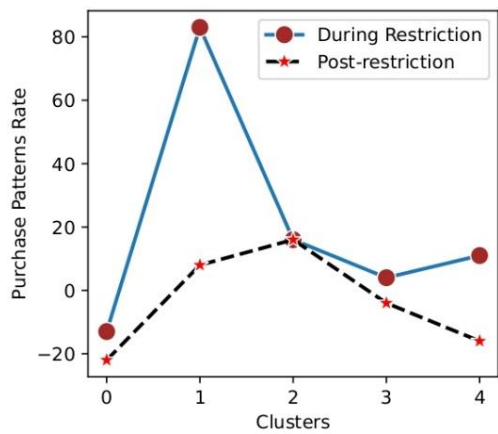
Fig. 6. Cluster-wise Purchase Patterns

Cluster-wise Consumption Quantity Patterns:

Fig. 7 highlights varied patterns in customer consumption quantity growth across clusters during and after restrictions. Cluster - 1 saw a substantial 72.1% increase during restrictions but faced a 7.5% decline post-restriction. Meanwhile, cluster - 4 experienced a marginal 0.7% growth during restrictions, followed by a significant 25.2% decline after the restriction.
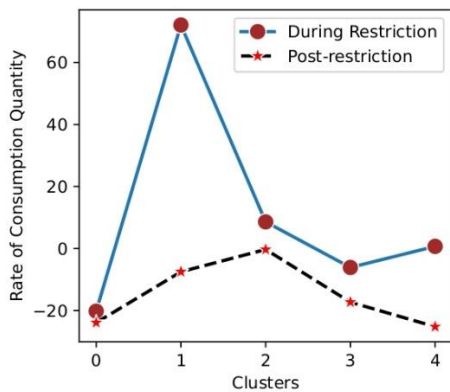

Fig. 7. Consumption Quantity Patterns

Cluster-wise Item Variations in the Basket: Varied item patterns in the basket were observed in

Fig. 8 across different clusters. Except cluster - 1 and cluster - 2, all other clusters faced a decline in both time periods. Cluster - 0 faced declines, experiencing a 24% reduction during restrictions and a further 18% decline after restrictions. Cluster - 3 witnessed a decline of up to 11% during restrictions, followed by a higher 13% decline after restrictions.
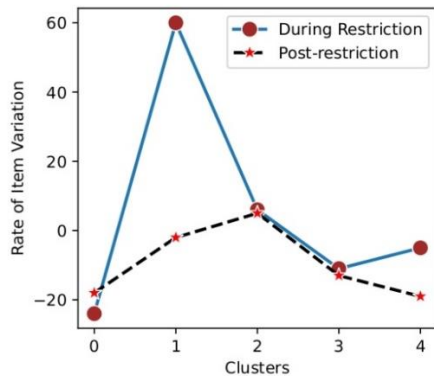

Fig. 8. Cluster-wise Different Number of Item Selection

Cluster-wise Customer Footfall Patterns: The analysis of

Fig. 9 revealed distinct trends in customer footfall across different clusters. While cluster - 1 and cluster - 2 experienced growth during the restriction, cluster - 0, cluster - 3, and cluster - 4 faced decline in both periods. Cluster - 1 exhibited substantial growth, experiencing an 82% increase during the restriction period and a 6% rise after the restriction. In contrast, cluster - 0 faced a decline, witnessing a 24% reduction in customer footfall during restrictions, with an additional 14% decline after the restriction.
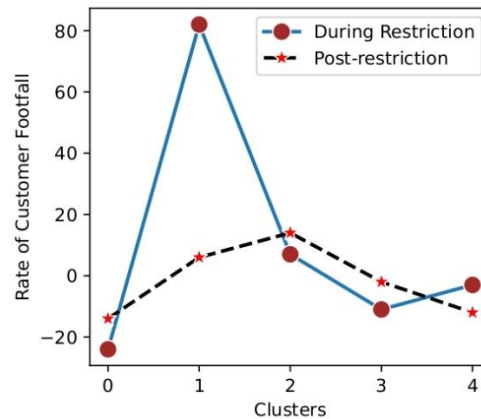

Fig. 9. Customer Footfall Analysis

Cluster and Category-wise Sales Patterns: The analysis unveils category-wise sales trends across different clusters. As shown in Table 4, cluster - 0 generally faced a decline in sales during both periods. Conversely, cluster - 1 exhibited substantial growth in most categories, except for vegetables, during and after the restriction period. In contrast, cluster - 4 experienced growth in various categories during restrictions (DR) but encountered a decline in most categories in the post-restriction (PR) period.

Table 4 - Cluster and Category-wise Sales Pattern

Clusters	0		1		2		3		4	
Category	DR(%)	PR(%)	DR(%)	PR(%)	DR(%)	PR(%)	DR(%)	PR(%)	DR(%)	PR(%)
Vegetables	-13.70	-19.04	-100.00		-5.35	-58.45	-9.31	-6.21	-9.23	-21.40
Fruits	-19.58	-20.81	166.85	36.23	120.57	-7.83	45.04	2.14	22.85	-12.78
General Merchandise	-9.85	-25.61	128.90	77.57	159.41	5.99	51.17	7.63	32.63	-9.37
Household	-6.59	-19.87	44.66	32.76	-72.00	290.16	35.68	8.36	22.64	-4.96
Dairy	5.03	-17.09	748.48	-55.16	25.19		108.47	4.46	72.38	-14.57
Fish	-25.47	-19.15	57.82	-4.56	-7.13	46.10	-4.43	2.79	-2.20	-21.77
Meat	-34.20	-18.65	166.77	27.83	33.02	48.82	27.58	9.61	15.33	-22.28
Grocery	-25.07	-1.77	74.13	0.55	20.80	10.45	-1.34	-9.52	2.01	-15.93
Frozen	-8.37	-10.14	9.27	75.39			-11.72	10.83	10.68	4.90
Baby Food	-9.40	-26.08	76.96	59.02	-67.71	234.26	9.31	32.24	22.32	4.37

Note. DR = During Restriction. PR = Post-restriction.

The findings highlight dynamic changes in customer preferences and purchasing habits. In 2021 and 2022, item prices doubled the inflation rate, leading to decreased customer purchasing power. During the initial year of the restriction period, customers increased consumption, but subsequent years saw a decline in quantities and spending. Despite stable category contributions, there was a notable shift towards local items over imported ones. K-means clustering analysis identified significant changes, with cluster - 1 showing an 83% increase in purchases during restrictions and 8% post-restriction, cluster - 0 experiencing a decline, and cluster - 2 increasing purchases by 16% across both periods. These insights illuminate the nuanced impact of movement restrictions on consumer behavior.

Discussion

The study's findings align with previous research on consumer behavior during economic disruptions, highlighting consistent patterns such as increased spending on essentials, reduced discretionary spending, and shifts towards local products. For instance, a study by Baker et al. (Baker, 2020) found that consumers prioritize essential goods during economic uncertainty,

mirroring our findings on increased basket values during the initial restriction period. Similarly, Goolsbee and Syverson (Goolsbee, 2021) observed a significant drop in retail foot traffic during movement restrictions, consistent with our customer footfall analysis. However, this study also provides novel insights into the nuanced impacts of movement restrictions on consumer behavior in the specific context of Bangladesh. The comprehensive analysis of a five-year dataset offers a unique perspective on how different customer segments adapted their shopping patterns in response to economic challenges. The k-means clustering analysis, in particular, highlights the importance of segment-specific strategies for businesses to effectively navigate such disruptions.

5. Conclusion

This study analyzes consumer behavior in Bangladesh during and after pandemic-induced movement restrictions, revealing that price shifts often outpaced inflation, reducing purchasing power and altering consumption patterns. Initially, consumers prioritized essential goods, leading to increased basket values, but subsequently reduced their item selection and quantity due to financial uncertainties. Footfall and visit patterns changed significantly, resulting in lower sales and revenue, slower inventory turnover, and cash flow challenges. The k-means clustering analysis showed varied responses across customer segments, highlighting the need for segment-specific strategies. These insights help businesses develop resilient strategies, optimize inventory management, and refine marketing efforts, while policymakers can design targeted interventions to support economic stability and consumer welfare during crises. The study faces limitations such as store-specific issues, geographic boundaries, and a limited sample size due to purposive sampling, which may not be representative of the larger population. The findings might not be generalizable to all regions or countries due to differences in the pandemic's severity and duration. Future research could explore the impact of movement restrictions across various sectors like retail, hospitality, e-commerce, and healthcare, and investigate long-term effects on consumer spending patterns. Additionally, further studies could examine how government regulations, cultural norms, and values influenced customer behavior during restrictions.

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