Consumer adoption of frozen food products in Uttarakhand, India during COVID-19 pandemic

Madhu Arora

Symbiosis Institute of Computer Studies and Research,
Symbiosis International (Deemed University),
Pune, India
Email: shamayutu@gmail.com

Rupesh Kumar*

Jindal Global Business School,
O P Jindal Global University,
Sonipat, Haryana, India
Email: rupesh.kumar@jgu.edu.in
Email: scholar.rupesh@gmail.com
*Corresponding author

Pradeep Chauhan

School of Business,
University of Petroleum and Energy Studies,
Kandoli Campus,
Dehradun, Uttarakhand, India
Email: pradeep.chauhan.ddun@gmail.com

Muddassar Sarfraz

School of Management,
Zhejiang Shuren University, China
Email: muddassar.sarfraz@gmail.com

Abstract: Safety and quality are of extreme importance along with abundance of time availability owing to work-from-home scenario. Consumers are now ready to experiment with the new types of food products. Authors have attempted to determine percentage of consumers with respect to adoption of frozen food products in this work. The study analyses socio-demographic characteristics and understand perception with respect to adoption of frozen food products. The findings of study indicate that of the respondents, 31% were categorised as early adopters, 23% as late adopters and 46% as non-adopters of frozen food products. Early adopters perceived frozen food products to be value for money, had trust on quality, safety and brand, and also found it tasty. The overall analysis leads to a better understanding of consumer adoption towards frozen food with special reference to quality and safety.

Keywords: consumer; perception; frozen food; socio-demographic; adoption; India.

Reference to this paper should be made as follows: Arora, M., Kumar, R., Chauhan, P. and Sarfraz, M. (2025) 'Consumer adoption of frozen food products in Uttarakhand, India during COVID-19 pandemic', *Int. J. Business Performance Management*, Vol. 26, No. 5, pp.598–614.

Biographical notes: Madhu Arora is presently working as an Assistant Professor - Selection Grade at the Faculty of Computer Studies, Symbiosis International University, Pune, India. She also worked as a Senior Assistant Professor at Sri Balaji University, Pune. She is a science graduate from Delhi University, an MBA in Operations Management from IGNOU, Delhi, and a Master's in Personnel Management from Pune University. She received her PhD in Management from the University of Petroleum and Energy Studies, Dehradun in 2022. She has more than 25 years of experience in the field of training, including academics and corporate.

Rupesh Kumar obtained his PhD from the IIT Roorkee. He completed his Post-Doc from the DEG – Departamento Engenharia E Gestao, Instituto Superior Tecnico, Lisboa, Portugal. He is working as an Associate Professor, Jindal Global Business School, O.P. Jindal Global University, Sonipat Haryana. He is having more than ten years of teaching and research experience. His research interests include supply chain management, operations management, operations research and information technology.

Pradeep Chauhan is working as an Assistant Professor at the School of Business in UPES. He has significantly contributed to the academic landscape, earning a PhD in the intricacies of logistics distribution of Fast Moving Consumer Goods (FMCG) from UPES, Dehradun, India. An accomplished scholar and researcher, his areas of expertise encompass warehousing and distribution, multimodal transportation, and global supply chain management. He has actively participated in various national and international conferences, where he has shared his expertise and contributed to the collective knowledge of the field. He stands as an exemplar of academic excellence and practical industry experience, bridging the gap between theory and real-world application in the complex domain of logistics and supply chain management. His passion for continuous learning and commitment to advancing the field make him a respected figure in both academic and industrial circles.

Muddassar Sarfraz is an Assistant Professor at the Zhejiang Shuren University, China, and a member of the Research Center for Engineering and Management at the Politehnica University of Timisoara, Romania, is a distinguished figure in academia. With a post-doctoral fellowship from the Hohai University, he excels in teaching diverse subjects like business research methods, corporate social responsibility, and strategic management. As a keynote speaker at national and international conferences, he is recognised for his expertise. His prolific publication record includes over 150 papers in international journals, reflecting his commitment to advancing knowledge. Holding editorial roles in various journals, he contributes significantly to academic discourse. Affiliated with prestigious organisations like the British Academy of Management and the American Economic Association, he also serves as an ambassador for the International MBA program at Chongqing University, representing Pakistan.

1 Introduction

Consumer behaviour is driven mostly by the perception the consumers hold towards health, quality and safety of the food products that they are purchasing (Nath et al., 2013; Grunert, 2005). However, according to a study by Vanhonacker et al. (2013), despite the fact that buyers guarantee to discover certain food credits, for example, 'wellbeing' and 'ecologically cordiality's significance, this does not really convert into conduct (Rejeb et al., 2021; WHO, 2019). There are many other reasons, which lead to purchase behaviour of consumers. An individual's intention to consume a food product depends to a great extent upon the accessibility, visibility and availability of the food product in the retail stores. Changing dynamics of the environment often brings about changes in consumption patterns. COVID-19 has brought about this impact on consumer's purchase decisions. With lockdown exercised in India, residents have more time and willingness to experiment with variety of food products and preparations, supported with the increasing number of retail outlets. Safety plays a predominant role in case of food scares or in times of crisis otherwise it plays a dormant role. Thus, considering the present times where COVID-19 has created a huge scare in the minds of consumer with respect to hygiene and safety, safety takes precedence over other product attributes too (as observed during survey). Binci et al. (2019) have suggested in their study that one of the primary underlying variables in business process management is feedback to change. And the changes in business models of various firms owing to the incidence of COVID-19 certainly proves it. So, the firms have to be future-reading while ensuring concern for the environment and consumer both.

The respondents targeted were those who visited retail outlets for making their grocery purchases. Before administering the questionnaire to them, the respondents were queried on whether they visited retail outlets for making their purchases and the questionnaire was administered only if the response was in positive. This was done primarily because in regions under Uttarakhand, the frozen food products are available at retail outlets or outlets specifically for such products. The survey collected data on socio-economic characteristics of respondents, their preferences, and the likelihood of trying frozen food products. To assess the likelihood of trying frozen food products, the respondents were asked to respond to one of the following statements:

1 I like to try frozen food products

2 sometimes I try frozen food products

3 I hardly ever try frozen food products.

The remaining paper is organised as follows: Section 2 discusses the literature reviewed. In Section 3, the methodology used and the tools applied for obtaining results are depicted. Section 4 presents data analysis. Section 5 presents results and discussion pertaining to the results and finally Section 6 discusses conclusions and future research scope. Section 7 discusses managerial implications and Section 8 presents limitations and future scope of study.

2 Literature review

Consumer adoption will depend upon the user's awareness of quality and safety of the product. A positive perception will lead to demand for the product while a negative perception will hinder the consumer from adopting the product. Hence, in order to enhance consumer adoption, it is important to also understand what the consumer perceives with respect to the safety and quality and other such aspects of the product.

Frozen food may be distributed through any of these forms (McKinnon and Campbell, 1998) directly from factory; retailer-arranged collection from factory; devoted cold store possessed or shrunk by maker; shared-client cold store shrunk by producer or essential combination community named by a retailer (Agarwal et al., 2020; Kumar et al., 2015; Kansara et al., 2022). According to in-house research led by McCain Foods Ltd. and published in July 2019, the global savoury snacks market is forecast to grow at a CAGR of 6.5% to reach US$143,258.6 million by 2022 from US$104,737.3 million in 2017. According to the report, portions of the elements that affect the degree of contest inside the business are quality, taste, brand notoriety and cost (Marketline, 2019).

A study done on organic food emphasises the importance of age and income to motivate the purchasing willingness of a consumer (Lockie et al., 2004; Kumar, 2020b). In a study done by Aaker (1997) awareness and belief in the brand was considered an important aspect considered during purchase process. One of the key challenges for the SCs in the present as well as times to come will be a highly sustainable SC (Rajak et al., 2021; Kashav et al., 2022). The study has employed best-worst method to identify the critical success factors for a sustainable SC. Ethical approach must be given due importance (Qazi et al., 2021) while ensuring sustainability and exerting efforts for enhanced consumer adoption of frozen food as the environment and health are at stake.

In a study done by Cox et al. (1997), there appeared to be a healthy degree of arrangement between the apparent admissions and utilisation. Seen boundaries represented the biggest segment of fluctuation in real food utilisation (Kumar et al., 2010, 2014). Also, family influences do shape attitudes towards consumption of a food product thereby suggesting that awareness and related messages should be for the entire family. Efforts of producers and retailers to promote food product consumption can certainly bring about changes in consumption patterns.

The consumer segments were explored based on the criteria of product preferences and consumption psychology with respect to e-shopping of the food products (Wang and Somogyi, 2018). The study indicated strong intentions of the participants towards online buying of snack food products and weak intentions of purchasing fresh food products on e-commerce websites. One of the main contributing factors for consumer lifestyle changes is the internet technology (Ali et al., 2021; Kumar et al., 2021). The study also examined influence of various factors, some of them being innovativeness, insecurity, optimism on the intention of consumer adoption. The study also studied the moderating role that situational influences like the pandemic can exert on adoption of consumer. The role played by product attributes in predicting intention of consumer adoption was examined by Taufik et al. (2022).

According to McKinnon and Campbell (1998), frozen food is a heterogeneous area involving an expansive scope of items, with an increase in the rate of growth specifically in the recent years thus reflecting a sharp increase in consumer demands for convenience food. There have been endeavours to limit the time stretch among reaping and freezing which is a vital determinant of the nature of the frozen item. The retailers also have a

specific level of impact in the frozen food market as there are some retailer's own name items as well (Tiwari, 2015). Own image items not just contend on the basis of both cost and quality (Kumar, 2020a), yet additionally now overwhelm in the creation of various new food sources items portrayed by comfort and curiosity (Burch and Lawrence, 2005).

In yet another study, Wang and Scrimgeour (2022) explored the influence that motive of selecting certain food items, socio-demographics, etc. have on consumer adoption. Assumptions of consumer and that of the market pose challenges to consumer adoption (Bentsen and Pedersen, 2021). Additionally, the study also pointed to the requirement for considering newer perspectives towards adoption of food products and/or food practices by the consumer. Szejda et al. in their study in 2021 on the customers in US and UK assessed the consumer preferences for cultivated meat based on different criteria like genetic modification, nomenclature, health enhancements, etc. Arora et al. (2022) in their study conducted a study to understand the influence of various factors on adoption of frozen food products.

In a study done on Irish consumers (Reed et al., 2003), it was deduced that for a number of consumers, the food items under investigation were bought as an advantageous other option or a week-by-week treat. Components like customer patterns and ways of life have added partially to the improvement of frozen food items. Nevertheless, alongside accommodation, tactile allure of items ought not to be neglected. Despite the fact that, according to the investigation, the analysts showed a generally undeniable degree of entrance of these items, in any case, it was likewise detailed that successive buy/utilisation was a lot of lower with higher number of shoppers being considered as light clients, serving the item once every month or less. In addition, a comparable outcome was achieved showing that the greatest segment of development is in reality in 'non-ethnic' dishes like shepherd's pie and bangers and crush (Tiwari, 2020). Considering that India is a country where consumers have more traditional and conventional eating habits, there could be a positive trend in growth of non-conventional food products. There is an expressed preference towards home-cooked food especially in a country like India however, if there are more efforts put on the sensory aspects and other product related attributes, there could be growth in the non-conventional food products. Quality control is essential as it not only increases production efficiency but also guarantees safety, health and high-quality product to the consumer (Viaene et al., 1998; Behnke and Seo, 2015; Suhartanto et al., 2019; Rajini et al., 2022).

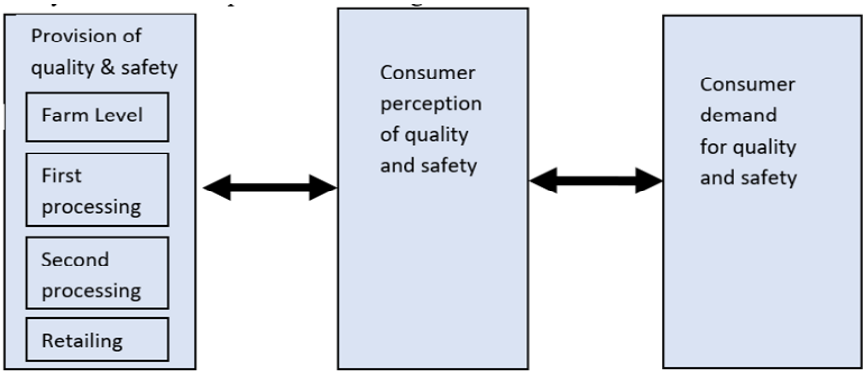
Discernment can be characterised as a cycle through which people are presented data, take care of the data and understand the data (Mowen, 1993). It is additionally underscored that purchaser impression of items is a significant issue since a positive shopper insight frames the base for uplifting outlook and a possible expansion in utilisation (Viaene et al., 1998).

In an investigation on foods grown from the ground utilisation, regular facilitators included family customs, medical advantages and comfort while overwhelming boundaries were discovered to be detachment, cost and time (Yeh et al., 2008). Customers today have gotten seriously demanding, more basic, and more divided in their food decisions (Grunert, 2005). As per the investigation, there have been three standards of exploration on food quality and wellbeing, managing shopper interest for quality and security, arrangement of value and wellbeing, and buyer impression of value and wellbeing. The relationship is reflected in Figure 1.

The maker feels that quality has both fair and close to home estimation, target estimation suggesting genuine properties while dynamic is as seen by customers. Brands

impact buy to the degree that they lessen chance and impart situating of the item to the shopper (Grunert, 2005). According to Yang et al. (2021), it is a combination of prices, including wholesale and retail prices, coupled with the degree of innovation that can make a SC efficient. An efficient supply chain can result in enhanced trust and confidence of the channel partners and ultimately the consumer.

Figure 1 Research on food quality and safety (see online version for colours)



Source: Grunert (2005)

Zeithaml and Grunert (as referred to in Konuk, 2018) allude to the connection between visible quality and cost as value for money. Prevailing situational circumstances may affect consumer willingness to pay and in situations like COVID-19 (Chaurasia et al., 2022; Ahmadini et al., 2021), consumers will be willing to pay more for a highly safe product. Though in general situations, consumers will be taking purchase decisions habitually but in special circumstances, consumer will be making well thought out and informed decisions. Kazemargi et al. (2022) in their study have suggested various innovative practices that can be implemented by the integration of partnering firms. The study emphasises that by exploitation of knowledge and innovation in products, the entire supply network can be strongly knotted.

2.1 Theoretical underpinnings

The theoretical premise on which the paper is based is the theory of diffusion of Innovation, which was developed. The theory explains how with time a product can diffuse through a population. Also, according to a study done by McLean-Meyinsse (1997), Diffusion theory can help guide the studies related to new products, services, technologies, etc. The theory will help understand the behaviour of a consumer towards a new product or service. The diffusion curve classifies consumers into various categories: innovators; early adopters; early majority; late majority and laggards. Innovators are consumers who tend to be risk takers, better educated, more affluent, socially active and mobile; early adopters are younger and cautious; early majority buyers are slow and deliberate; late majority buyers tend to be older and very cautious; while laggards are the last group to try a new product. There are many studies done on influencing the consumer adoption towards new products or services, however, not many studies have been done to analyse the characteristics of consumers belonging to the above categories.

Understanding of the characteristics of individuals falling in various categories will help focus the marketing efforts for increased adoption by the consumers.

2.2 Research gaps and highlights

A significant stream of exploration has zeroed in because of individual attributes, for example, socio-economics and social-psychographics on new item selection conduct, which has significant ramifications for the acts of market division and focusing, just as item situating and showcasing correspondence (Wang et al., 2008). The examination has additionally exhibited that social-segment attributes have huge impact on new item reception conduct and proposes that more younger population, higher pay and better instructed shoppers will in general acknowledge market advancements all the more rapidly. When education is high it acts as an enabler and when education is low it acts as a barrier (Nath et al., 2013; Kumar et al., 2022). There have been studies which have indicated that education, high levels of income, age, status with reference to style and image, number of people in the household, working people, regular use of credit cards, presence of younger individuals (15–24 years) in the household influence adoption of new products.

Though there are numerous studies on products like ready-meal, convenience products, etc., this study focuses only on frozen food products and studies the likelihood and characteristics of consumer adopting frozen food products.

3 Methodology

The research aims at assessing the level of adoption of frozen food products by Indian consumers with special reference to consumers of the northern state of Uttarakhand in India. A good understanding of consumer's likelihood of adoption is a pre-requisite for further research in the area of frozen food. Descriptive statistics with mean, SD and crosstab analysis was employed to arrive at the analysis of demographics and perception of consumers towards frozen food products.

The objective of this study was to identify the characteristics of consumers who adopt frozen food products readily, those who adopt it after sufficient time and thought and those consumers who are not willing to adopt frozen food products. The specific objectives of the study are:

- to analyse demographic characteristics of consumers with respect to frozen food consumption
- to evaluate consumer perception towards frozen food products especially during COVID-19 leading to adoption of frozen food products.

The research methodology is based on primary data collection by means of exploratory (qualitative) and conclusive (quantitative) consumer research.

The exploratory research was based on literature review to understand the factors influencing the purchase behaviour of consumers. The quantitative primary data were collected through a survey carried out using questionnaire as the instrument. The questionnaire comprised of three sections: first section collected data on demographic profile of respondents, the section collected data on preferences of respondents towards

frozen food products. The third section consisted of a few open-ended questions to elicit further the reasons of buying or not buying frozen food products and which type of frozen food products do they generally purchase. The questionnaire was disseminated using online platforms, namely Google Form.

Initially, a pilot survey was conducted to collect responses from 25 respondents. The responses thus collected were indicative that the survey instrument was justifiable and valid for the final study. The reliability test indicated Cronbach's alpha value as 0.691 indicating fair reliability.

Snowball sampling technique was used primarily to collect data related to adoption of frozen food products especially during the COVID-19 lockdown stage. The target population of the survey consisted of people living in Uttarakhand, India, aged between 15 and 65 years. The population of Uttarakhand is presently 101.17 lakh. As per Slovin's formula where n, number of samples = N / (1 + (N*e2) with N being total population and e being error tolerance, the overall sample size has been set at 533 respondents. The collected data was then analysed using statistical package SPSS Version 22. Descriptive statistics was primarily used for carrying out the analysis of the data thus collected.

4 Data analysis

India and specifically Uttarakhand, is a region where people have traditional and conventional eating habits and so the people of the region do not readily try frozen food products. Hence, it was necessary to:

1 understand whether the respondent was aware of frozen food products

2 identify the level of readiness towards adoption of frozen food products

3 analyse the characteristics of the different types of respondents based on readiness.

For point 1, response was collected regarding awareness and only the respondents who were aware were then considered for point 2. Thereafter, response was collected to identify the level of readiness towards adoption of frozen food products. As shown in Table 1, of the respondents, 31% have high level of adoption, 23% have medium level of adoption, and 46% have low level of adoption. As an extension of the diffusion theory, the respondents who were ready to try frozen food products can be referred to as 'early adopters' indicating high readiness to adoption, the respondents who were a little reluctant in trying frozen food can be referred to as 'late adopters' indicating medium readiness to adoption and the respondents who were not willing to try frozen food can be categorised as 'non-adopters' indicating low or negligible adoption.

Table 1 Level of adoption

		Frequency	*Percent*	*Cumulative percent*
Valid	Low	245	46.0	46.0
	Medium	122	22.9	68.9
	High	166	31.1	100.0
	Total	533	100.0	

Since the responses to the statement of trying frozen food products, has been categorised into Early, late and non-adopters, therefore the dependent variable, level of adoption has three discrete response categories. The study used crosstab analysis to study the demographic characteristics of early adopters, late adopters and non-adopters exhibited through Table 2.

Table 2 Demographic characteristics of early, late and non-adopters

Characteristic	*Early adopters (%)*	*Late adopters (%)*	*Non-adopters (%)*
Demographic variables (row-wise % calculated)			
City			
Metro	34.6%	21.9%	43.5%
Non-metro	23.2%	25.3%	51.5%
Gender			
Male	35.5%	5.0%	59.5%
Female	27.5%	37.8%	34.7%
Age (years)			
15–24	100%	0%	0%
25–40	28.1%	11.8%	60.1%
41–60	14.6%	36.7%	48.7%
Above 60	0%	37.7%	62.3%
No. of members in household			
1 or 2	11.5%	12.3%	76.2%
3–5	41.8%	17.7%	40.4%
Above 5	0%	100%	0%
No. of young members			
None	15.9%	7%	77.1%
1	31%	40.7%	28.2%
2	87.2%	12.8%	0%
>2	100%	0%	0%
Income (INR)			
<25,000	17.9%	0%	82.1%
25,000–50,000	8.7%	0%	91.3%
50,000–1 lakh	20.7%	13.2%	66.1%
>1 Lakh	39.2%	38.8%	22%
Highest education			
10+2	94.8%	5.2%	0%
Diploma	0%	0%	100%
Graduate	14.4%	17.8%	67.8%
Post-graduate	32.6%	42%	25.4%
Marital status			
Single	100%	0%	0%
Married	5.9%	31.3%	62.8%

Table 2 Demographic characteristics of early, late and non-adopters (continued)

Characteristic	*Early adopters (%)*	*Late adopters (%)*	*Non-adopters (%)*
Demographic variables (row-wise % calculated)			
Employment status			
In business	0%	32%	68%
In service	25.6%	17.6%	56.8%
Non-working	17.3%	41.8%	40.9%
Student	100%	0%	0%
Use of credit card			
Frequently	100%	0%	0%
Sometimes	29.7%	28.6%	41.6%
Never	4.4%	27.8%	67.7%
Not applicable (student)	100%	0%	0%

Descriptive statistics was conducted to determine the mean and standard deviation of responses along with skewness and kurtosis which is displayed using Table 3.

From Table 3 values, it is indicative that data are fairly to moderately skewed since most demographic variables have values lying between –0.5 and 0.5 which indicates fair skewness, while values lying between 0.5 and 1 or –1 and –0.5 are moderately skewed.

Most of the demographic variables indicate platykurtic distribution since the kurtosis is less than zero. This implies that conveyance is compliment (less crested) when contrasted and the typical dispersion, with less qualities in its more limited (for example lighter and more slender) tails. Only for two variables, number of young members and household income, the distribution is leptokurtic as kurtosis statistic value is greater than zero.

After the understanding of demographic characteristics of level of adopters, Table 4 will help understand the perception of early adopters vis-a-vis late adopters and non-adopters.

Table 3 Descriptive statistics for demographic characteristics

Demographic characteristic	*Minimum statistic*	*Maximum statistic*	*Mean statistic*	*Std. deviation statistic*	*Skewness statistic*	*Kurtosis statistic*
City	1	3	1.49	0.547	0.475	–0.909
Gender	1	2	1.55	0.498	–0.185	–1.973
Age (in years)	1	4	2.57	1.040	–0.067	–1.163
No members	1	3	1.83	0.544	–0.089	–0.039
No young members	1	4	1.72	0.751	1.021	1.066
Income (monthly in Rs.)	1	5	3.32	0.949	–0.935	0.429
Highest education	1	4	2.98	0.996	–0.837	–0.291
Marital status	1	2	1.73	0.443	–1.049	–0.903
Employment status	1	4	2.33	1.031	0.307	–1.039
Use of credit card	1	4	2.82	0.725	–0.172	–0.851
Level of adoption	1	3	1.85	0.886	0.291	–1.608

Table 4 Perception of adopters towards frozen food products

Perception variable	*Early adopters (%)*	*Late adopters (%)*	*Non-adopters (%)*
Value_for_Money			
Agree	39.7%	14.8%	0%
Disagree	0%	68%	40%
Unhealthy			
Disagree	88.6%	27.9%	5.7%
Agree	11.4%	68%	77.2%
Sure of quality			
Agree	100%	18.1%	5.7%
Disagree	0%	48.4%	31.8%
Sure of safety			
Agree	86.1%	0%	5.7%
Disagree	0%	96.7%	69.8%
Taste			
Agree	51.2%	18.9%	0%
Disagree	11.4%	44.3%	51.4%
Trust brand			
Agree	88.6%	47.5%	28.6%
Disagree	0%	34.4%	31%
Easy to cook/convenience			
Agree	100%	66.4%	68.9%
Disagree	0%	0%	16.7%
Easy availability			
Agree	100%	90.2%	100%
Disagree	0%	0%	0%
Offers variety/novelty			
Agree	97.6%	62.3%	21.2%
Disagree	0%	3.3%	31.4%
Meet preferences of family members			
Agree	37.4%	49.2%	5.7%
Disagree	0%	0%	16.7%
Buy because of poor cooking skills			
Agree	45.5%	83.4%	0%
Disagree	35.5%	3.3%	100%
Used mainly for snacks			
Agree	94.6%	53.3%	48.6%
Disagree	5.4%	46.7%	51.4%

Table 4 Perception of adopters towards frozen food products (continued)

Perception variable	*Early adopters (%)*	*Late adopters (%)*	*Non-adopters (%)*
Long shelf life			
Agree	100%	66.4%	86.9%
Disagree	0%	33.6%	0%
Chemical content			
Disagree	24.1%	24.6%	0%
Agree	0%	72.1%	77.1%
Less preparation time			
Agree	94%	22.2%	0%
Disagree	0%	44.3%	21.2%
Gives happiness/satisfaction			
Agree	81.9%	18.9%	5.7%
Disagree	11.4%	81.1%	52.6%
Sure about nutrient values			
Agree	35.5%	0%	0%
Disagree	42.8%	17.2%	21.2%

5 Results and discussion

From Table 2, it can be interpreted that early adopters possess the following characteristics: early adopters are mostly from metro cities. 35.5% males and 27.5% females are early adopters while 59.5% males and 34.7% females are non-adopters. Younger people in the age group of 15-24 years readily try frozen food products. Also, families with higher number of younger members in the household are mostly early adopters. Respondents who are single can be said to be early adopters for various reasons. And so are students because of poor cooking skills or convenience. The analysis also indicates that mostly those individuals who use credit card frequently are more ready to try frozen food products readily.

From Table 4, it can be interpreted that the most of the early adopters buy frozen food products perceiving them to be: value for money, trust about its quality, safety and brand, taste, easy availability, convenience, offers variety and novelty, helps meet varied preferences of different family members, used mainly for snacking purposes, have a long shelf life, do not believe it to be unhealthy, and gives happiness and satisfaction.

Whereas the late adopters do not buy frozen food products as much since they consider it to be unhealthy, not sure of quality, safety, chemical content, nutrient values. But late adopters do buy sometimes, though, as the products have long shelf life, less preparation time, used for mainly snacking purposes, helps meet preferences of family members, offers variety and novelty, are easily available, are easy to cook and so convenient, and also at times because of low interest in cooking.

Non-adopters do not buy frozen food products as they consider them to be expensive, unhealthy, do not trust quality, safety and chemical content. However, the non-adopters

do agree that frozen food products offer convenience, are easily available, can be used for snacking purpose and have a longer shelf life.

During the survey in the open-ended questions, most of the reasons given by respondents for purchasing the frozen food products were: convenience, variety, time saving, easy to cook, stays for longer duration, available in all seasons, and safety especially considering the COVID-19 scenario. These reasons quite coincide with the factors taken by the authors based on literature review. Responding to the question asking for reasons of not buying the frozen food products, some of them answered as preference to fresh products, easy availability of fresh products, healthiness of fresh products as compared to frozen food products, especially in households where the woman is a homemaker there is more preference to fresh food. When asked which items they generally buy frozen food for, the responses were: chicken items, frozen peas, parathas (Indian home-made bread), snacks, vegetables, fruits, dates, paneer (Indian cheese), fries to name a few.

6 Conclusions

The food organisations today are working in an exceptionally cutthroat climate. The variables that decide the degree of rivalry inside the business incorporate item quality, taste, brand notoriety, reliability, showcasing and publicising efforts, cost and item dispatches (Marketline, 2019). The analysis arrived at in the present study indicates that city type, age, number of young members in the household and economic status will influence the consumer adoption to frozen food products. Also, as consumers are quality conscious, their perception towards quality along with their family preferences will also influence their adoption to frozen food products.

A strong brand portfolio could be the strength of an organisation however consumer's changing preferences could be a threat to the organisation. Changing food habits due to changing lifestyle could be a major driving force for growth of frozen food products. The organisation ought to, subsequently, expect and offer items that are probably going to express the changing inclination of the shoppers while meeting every one of the essential guidelines in regards to wellbeing and quality set by the administrative bodies. With changing times, consumers will start looking for quick and easy meal solutions. However, considering Indian consumers, who are still traditional and more conventional in their approach towards food consumption, food manufacturers and retailers need to focus more on parameters like chemical content, health, safety and quality. Also, more awareness needs to be created with respect to these parameters for frozen food products. Certainly, in times like COVID-19, the strength of trust on brand is one major factor which gives confidence to a consumer about the hygienic safety and quality of the product as in such times, fresh is not always safe.

7 Managerial implications

The study can assist the producers/processors, the marketing managers, the retailers, and other decision-makers in various firms partnering in the cold chain to innovatively develop new products with the consumer preferences and health in consideration. The study will contribute in devising new marketing strategies to increase consumer adoption

of frozen food. The consumer demographic and preference analysis conducted in this study will help policy makers, strategists and other managerial personnel involved in various stages of the cold chain to gain a better understanding of the Indian consumer and accordingly be more innovative to catering to the appropriate and related needs of the consumer.

8 Limitations and future scope of the study

The present study is limited to collecting data only from respondents who were accessible through online medium owing to lockdown being exercised in the entire country. Therefore, respondents who were not available on technological platforms could not qualify for the sample selected for the study. Data collection from respondents who were not available online could certainly result in better reasons for adopting or not adopting frozen food products. Also, assuming frozen food products are available in urban cities, therefore, data collection has not been done from residents of rural area. The study has been conducted in Uttarakhand region of India and a similar study could be done in other regions of the country as well as for the entire country too. The study could be replicated in countries of other countries where consumer adoption of frozen food is still a concern. Further analysis on consumer attitude towards frozen food can be done using advanced statistical tools like structural equation modelling, techniques using fuzzy logic, TOPSIS, ISM, etc. Further comprehension and analysis of various factors influencing consumer adoption can help the cold chain partners understand the point of focus for their future plans and strategies.

The outcomes and limits of this examination would be a decent beginning stage for investigating future exploration needs in the space of frozen food items. The various factors influencing the adoption to frozen food products can be identified and impact can be ascertained. Organisations too can direct their focus towards converting non adopters to late adopters and late adopters to early adopters.

References

Aaker, J.L. (1997) 'Dimensions of brand personality', *Journal of Marketing Research*, Vol. 34, No. 3, pp.347–356.

Agarwal, S., Kumar, S. and Adichwal, N.K. (2020) 'Effect of marketing strategies on the market performance and a comparative study of online travel agencies in India', *Journal of Public Affairs*, Vol. 22, No. 1, pp.1–7, ISSN: 1479-1854, ABDC-B, DOI: 10.1002/pa.2381

Ahmadini, A.A., Adichwal, N.K., Meetei, M.Z., Raghav, Y.S., Ahmadini, M.A., Msmali, A. and Seth, N. (2021) 'Knowledge, awareness and practices (KAP) about COVID-19 in Jazan', *J. Stat. Appl. Prob*., Vol. 10, No. 2, pp.487–492.

Ali, S., Khalid, N., Javed, H.M.U. and Islam, D.M.Z. (2020) 'Consumer adoption of online food delivery ordering (OFDO) services in Pakistan: the impact of the COVID-19 pandemic situation', *Journal of Open Innovation: Technology, Market, and Complexity*, Vol. 7, No. 1, p.10.

Arora, M., Kumar, R. and Anand, N. (2022) 'Analysis of frozen food adoption by the consumer in Uttarakhand, a state of India: an inferential statistics approach', *International Journal of Value Chain Management*, Vol. 13, No. 1, pp.88–111.

Behnke, C. and Seo, S. (2015) 'Using smartphone technology to assess the food safety practices of farmers' market foodservice employees', *Journal of Foodservice Business Research*, Vol. 18, No. 1, pp.1–19, DOI: 10.1080/15378020.2015.995748.

Bentsen, K. and Pedersen, P.E. (2021) 'Consumers in local food markets: from adoption to market co-creation?', *British Food Journal*, Vol. 123, No. 3, pp.1083–1102, https://doi.org/10.1108/BFJ-03-2020-0173.

Binci, D., Belisari, S. and Appolloni, A. (2019) 'BPM and change management: an ambidextrous perspective', *Business Process Management Journal*, Vol. 26, No. 1, pp.1–23, https://doi.org/10.1108/BPMJ.06.2018.0158.

Burch, D. and Lawrence, G.A. (2005) 'Supermarket own brands, supply chains and the transformation of the agri-food system', *International Journal of Sociology of Agriculture and Food*, Vol. 13, No. 1, pp.1–18.

Chaurasia, V., Gupta, A., Patel, R., Chauhan, S., Adichwal, N.K. and Kamble, S. (2022) 'Self-care, household cleaning and disinfection during COVID-19 pandemic: a study from metropolitan cities of India', *Ann. Data. Sci*., DOI: 10.1007/s40745-022-00377-w.

Cox, D.N., Anderson, A.S., Lean, M.E.J. and Mela, D.J. (1997) 'UK consumer attitudes, beliefs and barriers to increasing fruit and vegetable consumption', *Public Health Nutrition*, Vol. l, No. l, pp.61–68.

Grunert, K.G. (2005) 'Food quality and safety: consumer perception and demand', *European Review of Agricultural Economics*, Vol. 32, No. 3, pp.369–391.

Kansara, S., Modgil, S. and Kumar, R. (2022) 'Structural transformation of fuzzy analytical hierarchy process: a relevant case for Covid-19', *Operations Management Research,* https://doi.org/10.1007/s12063-022-00270-y.

Kashav, V., Garg, C.P., Kumar, R. and Sharma, A. (2022) 'Management and analysis of barriers in the maritime supply chains (MSCs) of containerized freight under fuzzy environment', *Research in Transportation Business & Management*, Vol. 43, https://doi.org/10.1016/j.rtbm.2022.100793.

Kazemargi, N., Tavoletti, E., Appolloni, A. and Cerruti, C. (2022) 'Managing open innovation within supply networks in mature industries, *European Journal of Innovation Management*, Vol. 10, Emerald, DOI: https://doi.org/10.1108/EJIM.12.2021.0606.

Konuk, F.A. (2018) 'The role of store image, perceived quality, trust and perceived value in predicting consumers' purchase intentions towards organic private label food', *Journal of Retailing and Consumer Services*, Vol. 43, No. 1, pp.304–310.

Kumar, R. (2020a) 'E-applications for managing trans-logistics activities in sugar supply chain in North India', *International Journal of Asian Business and Information Management*, Vol. 11, No. 1, DOI: 10.4018/IJABIM.2020010106.

Kumar, R. (2020b) 'IT adaptation in sugar supply chain: a study at milling level', *International Journal of Logistics Systems and Management*, Vol. 35, No. 1, pp.28–49, DOI: 10.1504/IJLSM.2020.103862.

Kumar, R., Agrawal, R. and Sharma, V. (2014) 'Barriers to e-application in agri-food supply chain', in Wang, J. (Ed.): *Encyclopedia of Business Analytics and Optimization*, pp.235–248, IGI Global, Hershey, PA, DOI: 10.4018/9781-4666-5202-6.ch022.

Kumar, R., Agrawal, R. and Sharma, V. (2015) 'IT enablement in sugar supply chain: an approach for farmers', *International Journal of Business Performance and Supply Chain Modelling*, Vol. 7, No. 4, pp.360–381.

Kumar, R., Gupta, P. and Gupta, R. (2021) 'A TISM and MICMAC analysis of factors during COVID-19 pandemic in Indian apparel supply chain', *International Journal of Information Systems and Supply Chain Management*, Vol. 15, No. 1, DOI: 10.4018/IJISSCM.287133.

Kumar, R., Kansara, S., Bangwal, D., Damodaran, A. and Jha, A. (2022) 'Motivating factors to promote tourism in India: using AHP methods', *International Journal of Logistics Systems and Management*, Vol. 42, No. 3, pp.407–426, https://doi.org/10.1504/IJLSM.2020.10035317.

Kumar, R., Organero, M.M. and Agrawal, R. (2010) 'XML secure documents for a secure e-commerce architecture', *Global Journal of Enterprise Information System*, Vol. 2, No. 1, pp.35–45.

Lockie, S., Lyons, K., Lawrence, G. and Grice, J. (2004) 'Choosing organics: a path analysis of factors underlying the selection of organic food among Australian consumers', *Appetite*, Vol. 43, No. 2, pp.135–146.

Marketline (2019) *McCain Foods Ltd. SWOT Analysis*, July [online] https://store.marketline.com/search/company-reports (accessed 8 June 2020).

McKinnon, A.C. and Campbell, J. (1998) *Quick-Response in the Frozen Food Supply Chain: The Manufacturers' Perspective* [online] https://api.semanticscholar.org/CorpusID:55024343 (accessed 11 December 2021).

McLean-Meyinsse, P.E. (1997) 'Factors influencing early adoption of new food products in Louisiana and Southeast Texas', *Journal of Food Distribution Research*, Vol. 28, No. 3, pp.1–10.

Mowen, C.J. (1993) *Consumer Behavior*, 5th ed., Macmillan, USA.

Nath, V., Kumar, R., Agrawal, R., Gautam, A. and Sharma, V. (2013) 'Consumer adoption of green products: modeling the enablers', *Global Business Review*, Vol. 14, No. 3, pp.453–470.

Qazi, A.A., Shaikh, A.R. and Appolloni, A. (2021) 'Blow the whistle or dance to a tune! An ethical dilemma', *Emerging Markets Case Studies*, https://doi.org/10.1108/EEMCS.01.2021.0018.

Rajak, S., Mathiyazhagan, K., Agarwal, V., Sivakumar, K., Kumar, V. and Appolloni, A. (2021) 'Issues and analysis of critical success factors for the sustainable initiatives in the supply chain during COVID-19 pandemic outbreaks in India: a case study', *Research in Transportation Economics*, Vol. 101114, https://doi.org/10.1016/j.retrec.2021.101114.

Rajini, R., Heggde, G. and Kumar, R. (2022) 'Services redesign strategies for demand and capacity management: an approach of company performance evaluation', *Vision*, Sage, https://doi.org/10.1177/09722629221107238.

Reed, Z., McIlveen-Farley, H. and Strugnell, C. (2003) 'Factors affecting consumer acceptance of chilled ready meals on the island of Ireland', *International Journal of Consumer Studies*, Vol. 27, No. 1, pp.2–10.

Rejeb, A., Rejeb, K. and Keogh, J.G. (2021) 'Enablers of augmented reality in the food supply Chain: a systematic literature review', *Journal of Foodservice Business Research*, DOI: 10.1080/15378020.2020.1859973.

Suhartanto, D., Ali, M.H., Tan, K.H., Sjahroeddin, F. and Kusdibyo, L. (2019) 'Loyalty toward online food delivery service: the role of e-service quality and food quality', *Journal of Foodservice Business Research*, Vol. 22, No. 1, pp.81–97, DOI: 10.1080/15378020.2018.1546076.

Szejda, K., Bryant, C.J. and Urbanovich, T. (2021) 'US and UK consumer adoption of cultivated meat: a segmentation study', *Foods*, Vol. 10, No. 5, p.1050.

Taufik, D., Bouwman, E.P., Reinders, M.J., Noppers, E.H. and Dagevos, H. (2022) 'Leveraging intrinsically rewarding symbolic attributes to promote consumer adoption of plant-based food innovations', *Cleaner and Responsible Consumption*, Vol. 4, No. 1, p.100050.

Tiwari, S. (2015) 'Framework for adopting sustainability in the supply chain', *International Journal of Automation and Logistics*, Vol. 1, No. 3, pp.256–272.

Tiwari, S. (2020) 'Supply chain integration and Industry 4.0: a systematic literature review', *Benchmarking: An International Journal*, Vol. 28, No. 3, pp.990–1030.

Vanhonacker, F., Pieniak, Z. and Verbeke, W. (2013) 'European consumer perceptions and barriers for fresh, frozen, preserved and ready-meal fish products', *British Food Journal*, Vol. 115, No. 4, pp.508–525.

Viaene, J., Verbeke, W. and Gellynck, X. (1998) 'Quality perception of vegetables by Belgian consumers', in *XXV International Horticultural Congress, Part 14: Horticultural Economics at Micro and Macro Level, International Trade and*, August, Vol. 524, pp.89–96.

Wang, G., Dou, W. and Zhou, N. (2008) 'Consumption attitudes and adoption of new consumer products: a contingency approach', *European Journal of Marketing*, Vol. 42, Nos. 1/2, pp.238–254.

Wang, O. and Scrimgeour, F. (2022) 'Consumer adoption of online-to-offline food delivery services in China and New Zealand', *British Food Journal*, Vol. 124, No. 5, pp.1590–1608, https://doi.org/10.1108/BFJ-03-2021-0208.

Wang, O. and Somogyi, S. (2018) 'Consumer adoption of online food shopping in China', *British Food Journal*, Vol. 120, No. 12, pp.2868–2884, https://doi.org/10.1108/BFJ-03-2018-0139.

WHO (2019) December [online] https://www.who.int/emergencies/diseases/novel-coronavirus-2019 (accessed 8 June 2020).

Yang, W., Si, Y., Zhang, J., Liu, S. and Appolloni, A. (2021) 'Coordination mechanism of dual. Channel supply chains considering retailer innovation inputs', *Sustainability*, Vol. 13, No. 2, p.813, https://doi.org/10.3390/su13020813.

Yeh, M.C., Ickes, S.B., Lowenstein, L.M., Shuval, K., Ammerman, A.S., Farris, R. and Katz, D.L. (2008) 'Understanding barriers and facilitators of fruit and vegetable consumption among a diverse multi-ethnic population in the USA', *Health Promotion International*, Vol. 23, No. 1, pp.42–51.