SUSTAINABLE FOOD PRODUCTION AND DEMAND

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ABSTRACT

Sustainable food production incorporates concerns about the environment, the economy, and society from a variety of angles. Challenges to the sustainability of food production systems include resource rivalry, increased food demands, environmental deterioration, and the integration of agriculture into the global economy. Taking into account its extensive socio-economic ramifications, this analysis begins by summarizing the essential features that set sustainable food production apart from traditional farming methods. A summary of new green technologies that support sustainable food production is also provided. Urban agriculture, next-generation plant-based foods, and food nanotechnology are a few of these contemporary methods that are covered in-depth. Lastly, research projects and forward-thinking ideas are put out to offer direction for creating a sustainable agri-food system.

KEYWORDS: Conventional Food, Organic Food, Purchasing Decisions, Knowledge, Consumer, Nutrient

1. INTRODUCTION

The Green Revolution, which took place between 1960 and 2000, is seen as a unique stage of greater global food security. Due to the expansion of rural agriculture, there was a noticeable increase in the production and distribution of food worldwide during this time. The development of crop research, the growth of agriculture, mechanization, and the widespread application of synthetic fertilizers, pesticides, and genetically modified high-yielding crop species all contribute to this intensification. Even with the advancements in food production, there may still be some detrimental effects on the environment and public health. For example, the conversion of forest to pasture or agricultural land has resulted in increased emissions of greenhouse gases and contamination of the air and water. Overuse of phosphorus and nitrogen has had detrimental effects on the aquatic ecosystem. Runoff from agricultural watersheds and nitrogen enrichment caused eutrophication of water bodies. Significant malnutrition has resulted from the rise of low-cost, high-energy, low-nutrient fast-food options in many regions

of the world. Rethinking the Agri-Food system and reducing its environmental impact are crucial given the ongoing degradation of soil and water in agricultural landscapes, as well as the reduction in biodiversity and ecosystem services.

Agri-Food systems cover the full spectrum of variables and related initiatives, ranging from food production, processing, distribution, and consumption to food product disposal. Since the turn of the century, there has been an increase in interest in sustainable food production, which is seen as the philosophy of the food agricultural system and interacts with other important systems such as the energy, trade, health, and others. Its core beliefs are based on elevated consciousness and empowerment, where short-term viability should be balanced with long-term sustainability. It is important to remember that all operations and performances ought to be co-optimized and balanced from the perspectives of the environment, society, and economy. In practice, sustainable food production reduces environmental consequences by making efficient use of resources like energy, materials, and manufacturing processes. From a societal perspective, sustainable food production connects the local resources with the robust Agri-Food networks, ensuring food security and nutrition for future generations. As a result, the economic factor is related to risk assessment and mitigation, business establishment, and the creation of profitable but low-cost food products.

1.1 What is Sustainable food?

The most prevalent definitions of foods produced organically place emphasis on the "organic philosophy," as well as the technology, principles, and/or production techniques employed *(e.g., Bourn and Prescott, 2002; FAO, 1999)*. While some definitions emphasize the limited use of artificial chemicals in organic production *(e.g., FAO, 1999; Yi, 2009)* or its general philosophy *(Torjusen et al., 1999)*, others highlight dimensions such as "biological" or "natural production system" *(Klosky and Tourte, 1998)* and "green" or "environmental friendliness" *(Bhaskaran et al., 2006)*. organic foods are enhanced rather than artificially sweetened, preserved, or exposed to radiation in order to preserve food integrity. To put it simply, food that has been grown or processed without the use of chemical pesticides, mineral fertilizers, or other processing aids is considered organic food. "Antibiotics and growth hormones may not be fed to animals that produce food that comes from living things, such as meat, eggs, and dairy" (Sustainable food Production Act, 1990). Therefore, conventionally safe foods that are produced with ecologically and environmentally sound practices without the use of synthetic inputs like pesticides and chemical fertilizers, as well as without the use of industrial solvents, irradiation, or chemical food additives, are considered organic *(Paul and Rana, 2012)*. Additionally, organic foods do not contain genetically modified organisms (GMOs).

1.2 SCOPE OF THE STUDY

Eating Sustainable food encourages harmony between humans, other living things, and the environment. Additionally, it supports the avoidance of artificial preservatives and works to preserve food originality. This ensures health by preventing the overuse of dangerous chemicals. The purpose of this study was to learn more about how consumers purchase Sustainable food and determine whether there is a chance that this behavior could alter. But before any behavior is altered, it's important to assess how customers currently perceive things. Thus, the primary focus of this study will be on how consumers behave toward and perceive the need to buy organic food.

1.3 STATEMENT OF THE PROBLEM

In addition to the fact that there are more products on the market, consumer attitudes and consumption patterns have evolved from inorganic to organic products in recent years. However, this study focuses on evaluating the influence of products and consumer buying behavior. Organic products are the new trend in the consumer market, where consumers need to understand the needs of products as well as consumer benefits.

2. REVIEW OF LITERATURE

Joshi, Dinkar & Barker, Nitin & Zechariah, Jayant. (2023). The research carried out in the Nainital area of Uttarakhand state examined the purchasing habits of customers with regard to Sustainable food items, utilizing information gathered from 110 participants. Henry Garrett's ranking test was employed in the study's analysis. The goal of the study was to identify the variables influencing consumers' decisions to buy organic goods. According to the study, the following factors are ranked 1 through 9, in order of importance: availability, price, quality, recommendations from others, environmental concern, brand, advertisement, awareness, and personal experience. This suggests that the primary consideration should be availability.

Mahongnao, Mirinchonme & Varah, Franky & Khamrang, Sophayo. (2022). Research on the variables influencing the consumption of Sustainable food is becoming more and more important as Sustainable food consumption grows globally. Previous studies produced conflicting findings and did not provide a comprehensive picture of India's Sustainable food consumption. The purpose of this research is to identify the variables that affect the inclination of young Indian consumers to purchase organic food. A thorough questionnaire study of young Indian customers, ages 15 to 30, was designed to investigate the correlation between the identified critical criteria. In New Delhi, India, 289 young Indian consumers provided data using a self-administered structured questionnaire. The results demonstrate that social pressure, product quality, and environmental concerns all play a significant role in determining young consumers' intentions to purchase organic food. It has been discovered that the influence of price, trust, fear, and health consciousness on the intention to purchase Sustainable food is negligible. The results have implications for Indian politicians, marketers, and producers of Sustainable food who want to see a rise in the consumption of organic food.

L. Paul Edis and R.P. Ramesh (2021) explain that purchase behavior effect as well as food quality, price, and convenience have an impact on market buying intentions. Additionally, the study shows that there is no relationship between attitude and the intention to buy. The Indian government, strategists, producers, and marketing professionals need to focus more on the advantages of eating foods cultivated organically in order to support the Sustainable food sector.

Branislav Dudic, Dragana Cirovic, and Bogdan Melovic (2020) The study concludes that the primary factors are the organic product, pricing, distribution channel, and promotion. The study demonstrates that consumer acceptance and purchasing decisions are highly predicted by pricing and promotion. The variables that are thought to have the greatest influence on customer perception and attitudes about the offers that are now on the market include distribution hurdles, price/quality ratios, attitudes toward Sustainable food items, and the use of modern media as a promotional tool.

Yuta Wijaya Handranata, Dewi, and Kunti Murbarani (2019) looked at the variables like perceived price, availability, subjective norms, health consciousness, and understanding of Sustainable food that affect consumers' real purchasing decisions. The study demonstrates how availability, health consciousness, and purchase intention influenced people's behavior toward organic food. It is anticipated that the study will be able to investigate Indonesians' desire to enhance their health and support Sustainable food marketers.

2.2 RESEARCH GAP

According to the literature review, the majority of studies concentrated on how social and demographic factors affected consumers' purchasing decisions, and very few studies addressed the reason behind consumers' unwillingness to pay a premium for Sustainable food despite being aware of its advantages.

3. OBJECTIVES OF THE STUDY

1. To the Factors impacting Indian Consumers' purchasing behavior towards Sustainable food products and its demand in Meerut city
2. To analyze the factors influencing consumer behavior and willingness to pay towards Sustainable food products in Meerut city

4. HYPOTHESIS OF THE STUDY

1. Accessibility of Sustainable food Products has no impact on Consumer Buying Behavior towards Sustainable food products in Meerut city
2. Awareness of Sustainable food Products has no impact on Consumer Buying Behavior towards Sustainable food products in Meerut city
3. Concern for health has no impact on the consumer buying behavior towards Sustainable food products in Meerut city

5. RESEARCH METHODOLOGY

The purpose of this study is to investigate how purchasing habits for Sustainable food products are influenced by factors such as availability, quality of life, and health consciousness. The survey has been undertaken to analyze the consumer's buying behavior towards purchase of Sustainable food. The study is based on both primary and secondary data. The data collected are classified and analyzed keeping in view the objectives of the study. The studies demographic consists of people of Meerut who purchase and use Sustainable food products. Based on a convenience sampling approach, data was gathered using a self-reporting questionnaire. Using a questionnaire, customers answered the questionnaire; the survey obtained 250 replies. A self-reporting questionnaire measuring health consciousness, quality of life, product availability, and purchasing behavior is used to gather primary data. Five-point Likert-scale questionnaires, with responses ranging from strongly disagree (1) to strongly agree (5), are used to gather data from recognized customer replies. Cronbach's alpha has been used to quantify data reliability. Reliability, correlation analysis, and regression analysis have all been conducted using SPSS-20. Regression analysis has been used to determine how availability of products, quality of life, and health consciousness affect consumer behavior.

6. RESULTS AND DATA INTERPRETATION

6.1 DEMOGRAPHIC PROFILE OF THE RESPONDENTS

Five criteria were used to determine the respondents' demographic profile: gender, age, monthly income, level of education, and employment status. The Table displays the same information.

TABLE 6.1 DEMOGRAPHIC PROFILE OF THE RESPONDENTS

Descriptive Statistics	Particulars	No. of Respondents	Percentage
Gender	Male	180	72.0
	Female	70	28.0
	Total	**250**	**100**
Age	Below 20	23	8.2
	21 – 40 years	182	72.8
	41 – 60 years	39	15.6
	Above 60 years	6	2.4
	Total	**250**	**100**
	Below Rs.5000	30	12.0
	5000 – 10000	131	52.4
	10000 – 15000	46	18.4

Monthly Income	Above 15000	43	17.2
	Total	**250**	**100**
Educational Qualification	School Level	81	32.4
	Graduate	128	51.2
	Post Graduate	29	11.6
	Professional	12	4.8
	Total	**250**	**100**
Occupational Status	Government \ Private Employees	118	47.2
	Professional	4	1.6
	Cooly	54	21.6
	Home Maker and Retired People	74	29.6
	Total	**250**	**100**

Table shows that, in comparison to female respondents (28.0%), male respondents (72.0%) made up the majority of the sample data. The largest proportion of responders (72.8%) was between the ages of 21 and 40, while the smallest percentage (2.4%) was over 60. The majority of respondents in the sample were also found to be graduates (51.2%), to have a monthly income between Rs. 5000 and Rs. 10,000 (52.4%), and to be employed by the government or the private sector (47.2%).

TABLE-6.2: SAMPLE ADEQUACY (KMO AND BARTLETT'S TEST)

KMO and Bartlett's Test		
KMO and Bartlett's Test		.845
Bartlett's Test ofSphericity	Approx. Chi-Square	7744.809
	df	248
	Sig.	.000

The results of the KMO and Bartlett's Test of Sample Adequacy, which are both more than 0.8, indicate that the sample is suitable for factor analysis. The value of .845 indicates this. Additionally, it has been claimed that the Chi-Square value for the Bartlett's Test of Sphericity, with 248 degrees of freedom, is 7744.809. The variables are assumed to be orthogonal (not associated at all) in the Bartlett's Test of Sphericity under the Null Hypothesis, which means that component analysis is neither necessary nor appropriate. In the event that a correlational structure is present and the variables lack orthogonal orientation, a factor analysis must be appropriately carried out to identify the underlying structure. An extremely small p-value, near to zero (0.000), and a high Chi-Square

value indicate that the null hypothesis should be rejected and that there is a correlation between the variables, making them appropriate for factor analysis.

TABLE 6.3 PERCEPTION OF CONSUMERS TOWARDS THE PURCHASE OF SUSTAINABLE FOODPRODUCTS

Variables	Component				
	1	**2**	**3**	**4**	**5**
Healthy	**.413**	.195	-.107	.128	-.144
Freshness	**.404**	.099	-.098	-.167	.225
Value for money	**.476**	.092	.287	.393	-.118
Maintain diet balance	**.432**	.172	.099	.052	.413
Product Attribute					
Enhance energy	.080	**.745**	.135	.1064	.151
Protect environment	-.155	**.708**	-.017	.338	0.01
Improve immunity power	.448	**.696**	-.083	.044	.101
High nutritional value	.378	**.673**	.306	-.096	-.102
Natural ingredients	.350	**.619**	.2947	0.03	.028
Social Welfare					
Local economy	.181	.062	**.686**	.135	.325
Savings Resources	.046	.158	**.632**	.119	.159
Positive image	.117	.266	**.523**	-.164	.104
No additives	.126	-.042	**.496**	.296	.087
Animal welfare	-.289	.299	**.489**	.343	.095
Product Feature					
Fashion \ more appealing	.099	-.045	.087	**.669**	.128
Low price	-.148	.211	.058	**.655**	.373
Taste better	.285	.113	0.03	**.574**	-.087
Sustainability	-.228	.158	.429	**.566**	.059
Attractive packaging	.269	.036	.023	**.367**	.029
Availability					
Easily available	.05	-.107	.135	.307	**.680**
Seasonal product	.117	.023	.407	.102	**.664**
Produced without pesticides	.075	.164	.349	-.180	**.657**
Safety	.119	.288	-.455	.298	**.504**

The findings of the factor analysis for the twenty-five statements (factors) related to attitudes toward buying Sustainable food are displayed in Table. Evidently, all twenty-five assertions were reduced to five elements, and each factor—perceived health, product characteristic, social welfare, product feature, and availability—now corresponds to a specific statement.

6.2 IMPACT OF FACTORS ON THE BUYING BEHAVIOUR TOWARDS ORGANIC FOOD

Multiple regression analysis is used to quantify how the identified characteristics affect consumers' purchasing decisions. Cronbach's alpha is used to assess each factor's item reliability.

TABLE 6.4 FACTORS INFLUENCING THE PURCHASE OF ORGANIC FOOD

S.No.	Attributes	No. of Items	Cronbach's Alpha
1.	Perceived Health	6	0.955
2.	Product Attribute	5	0.935
3.	Social Welfare	5	0.986
4.	Product Feature	5	0.915
5.	Availability	4	0.996

Because the Cronbach's Alpha values in Table are greater than 0.9, the scale's conclusions about the factors influencing the purchase of Sustainable food are more dependable. Product Attribute is now down to 5 because the variable pertaining to respondents' perceptions of their natural component content was eliminated because it had a low correlation value. A variable pertaining to their stance on animal welfare was eliminated because it had a lower correlation than the other five variables that make up social welfare.

TABLE 6.5: ANOVA (REGRESSION MODEL)

ANOVA [a]					
	Sum of Squares	df	Mean Square	F	Sig.
Regression	9152992985.46	18	534,367,855.72	192.78	.000
Residual	1356573326.88	231	3,452,085.37		
Total	9399455223.43	249			
a. Dependent Variable: Monthly Demand					

Table then displays the model coefficients together with the corresponding t-test. There is a t-test available for every input variable. Against the alternative hypothesis that the beta coefficient differs from zero, the null hypothesis holds that the beta coefficient is zero. Because the test is run at a significance threshold of 5%, the

null hypothesis is rejected for any p-value less than 0.05, indicating that the variable is significant for both fitting the model and forecasting the overall amount spent on Sustainable food goods.

TABLE 6.6: MODEL COEFFICIENTS

Coefficients [a]					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1948.60	167.673		11.157	.000
Reference Group	734.08	167.825	.156	3.801	.000
Culture	182.88	167.826	.037	.856	.392
Economic Status	273.17	167.825	.073	1.757	.037
Health	591.03	167.827	.144	3.483	.001
Learning	450.93	167.825	.122	2.943	.003
Perception	783.17	167.826	.189	4.635	.000
Accessibility	137.75	167.824	.035	.766	.444
Stages in Life cycle	-95.73	167.825	-.023	-.514	.608
Awareness	280.96	112.988	.063	2.241	.013
a. Dependent Variable: Purchase of Sustainable food Product					

The sole demographic variable influencing the purchase of Sustainable food products is income, according to t-tests for each variable. Another variable that appears to be important is whether or not a person has children, albeit at a slightly higher level of significance (0.06). Health, learning, perception, availability, economic class, and reference group forces are the nine elements found in the factor analysis that have a substantial impact on buying Sustainable food products.

7. CONCLUSION

An excellent way to analyze the elements impacting respondents' purchasing decisions regarding Sustainable food is to look at consumer behavior. A consumer is more likely to purchase organic foods when factors including perceived health, product characteristic, social welfare, product feature, and availability are present. Purchasing Sustainable food might be motivated indirectly by factors such as availability, food safety, nutritional value, and awareness of availability. Because perceived health and product attributes are highly correlated, people feel that eating Sustainable food is beneficial to their lives. Given that perceived health has the least amount of influence

of all the factors, the price of the goods should be kept to a minimum and guarantee certification should be given careful consideration. The study came to the conclusion that people would buy Sustainable food because they were concerned about their health, quality, safety, and financial worth. Examining the impact of health consciousness, quality of life, and organic product availability on organic product purchasing behavior is the primary goal of this research. The study's findings showed that purchasing habits for organic items are highly predicted by factors such as availability of organic products, quality of life, and health consciousness. This study looked at more opportunities for organic product manufacturers and marketers, which might aid them in creating marketing plans to appeal to a wider consumer base.

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