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Investigating the Attitudes of Consumers and Producers Toward Organic Food and Sustainability in Uttarakhand

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ARTICLE INFO	ABSTRACT
	The purpose of this research is to understand consumer and producer attitudes of organic food and sustainability with special focus on Uttarakhand State in the India due to the increasing need for sustainable agriculture. Perceptions, the main factors that govern the choice of organic food, and the effect of the social demographic characteristics are other features explored in the research. Questionnaires were self-administered on 500 participants out of which 300 were the consumers and 200 were the producers adopting a quantitative research method. Statistical tests implemented while analyzing data included Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), Structural Equation Modeling (SEM), t-test, and ANOVA in the uses of the SPSS version 27 and AMOS version 24. These findings show a difference, where it depicts that the consumers have a greater purchase intent than the producers, namely 4.1 (mean) with 0.8 standard deviation for consumers and 3.5 (mean) with 0 .9 standard deviation for producers, t = 4.89, p < 0.001. Through analysis of variance results, trough the test F (2,497) = 5.67 at a significance level of 0.003, the results showed that the sustainability consciousness level is highly dependent with the income level and that those with an income of above INR 40,000 had a higher sustainability consciousness level as opposed to the others. Furthermore, analyses conducted with SEM support the hypothesis that sustainability consciousness has significant positive relationship with purchase intentions (τ = 0.51, p < 0.001) as well as the perceived benefits (τ = 0.42, p < 0.001). Thus, the results presented above make a call to effective awareness campaigns and policies to meet the demand for organic foods. **Keywords:** Sustainability, Organic Food, Consumer Attitudes, Uttarakhand, Structural Equation Modeling

INTRODUCTION

The concerns of the people of the world over environmental concerns have triggered more and more emphasis on the production and consumption of organic food. For these various reasons and many others, organic farming can be considered as the environmentally friendly method of farming in contrast to conventional farming. Most customers are more conscious about their health status and the environment through their diets and hence the change of pace in the demand for organically produced foods. However, they are factors that determine the likelihood of consumers embracing organic food such as knowledge awareness, perceived benefits, the consumer's status and the availability of the produce in the market. The attitude of the producers depends with the challenges as relates to cost, certification, and market in a pull factor aspect of organic farming. It is crucial to comprehend these paradigms to design suitable measures for popularizing organic food and sustainability in agriculture. The matter of facts is that the market of organic foods in India has been growing due to the growing awareness of the need for a healthy diet and the political support of the government in the implementation of the strategy of the organic farming. Uttarakhand being an agro-based state with diverse bio-logical endowment has always been actively participating in organic farming. Despite the fact that the state government has come up with various supporting policies and schemes for organic farmers, consumers are yet to fully apply organic foods when in the market. Social factor that impact on the consumption patterns of organic products includes Occasionally the consumer has interest in the buying of organic products although he is hindered on the following aspects: available of the products, the price at which they are offered and whether or not he has faith in the authenticity of the organic certification mark. The producers, as much

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as they are encouraged to adopt the organic methods, face financial constraints and inadequate structures. Studying the consumers and producers' perception is important to gathering the insights about the existing lack of awareness, policies, and market structures that inhibit further development of the organic food industry.

In order to obtain the data about the perception of consumers and producers, a quantitative structure was adopted to capture all the insights from the enterprises. Regarding survey questions, these included aspects like sustainability consciousness, perceptions on the organic food and their purchasing intention. In data analysis, exploratory and confirmatory factor analysis and structural equations model in addition to comparative tests were employed. These methods facilitate proving the correlation between the levels of sustainability awareness on one hand and the consumers' behavior and producers 'difficulties on the other hand. The findings thus expand the global knowledge on sustainable food systems, providing policy rationales that could be useful to policymakers, market players, and agricultural agencies.

The findings of this study are not limited to Uttarakhand, as they shed the light on such issues and perspectives that are comparable to other agrarian economy states. Thus, organic food adoption cuts across the chain, within the consumers, producers, and policymakers who need to provide an environment that supports the change. Overall, this study contributes to the understanding of drivers as well as barriers to organics for future research and to offer crucial insights as to how the organic market and its consumers can be supported and protected. The findings can then be used to develop policy solutions that create more stewardship for organic farming to become a better practice throughout the food system.

LITERATURE REVIEW

Over the last few years, the market of organic foods in Uttarakhand has been on the rise based on the fact that it is sustainable and economically productive for its producers. Based on literature analysis, health consciousness and safety concerns are the main factors that human consumers are more likely to patronize organic products, as analyzed by Ram and Prakash (2024) where the COVID 19 pandemic has boosted the intake of organic products to boost one's immunity level. Like the current study, Xie et al. (2015) determined that concerns and concerns, education level, disposable income, and family make a difference on the buy and purchase of organic foods thus support the notion that awareness, and financial capacity are paramount in the adoption of the practice. Kumar et al. (2019) went further to agree by identifying the relationship between the consumers' attitude and the benefits of the food safety, the environment, and the welfare of animals arguing that the ethical factor played a key role in the consumption of organic food. On the producer side, Saxena and Vij (2025) stated that the level of farmer's belief on organic principles as well as government support have a direct positive influence to adoption of organic agriculture of which policy induce support is key. As Joshi pointed out, trust and price are still the major concerns for organic food consumers, meanwhile, consumers regard organic food as an omnivores' choice instead of a simple choice of nutritionally superior food, as stated by Singh and Pathak (2020). However, some limitations that have been observed are high certification costs, inadequate infrastructure and some of the products are expensive to the consumer (Ram & Prakash, 2024). Still, as analyzed in research conducted by Negi et al. (2022) the geographic condition of Uttarakhand is fortunate that possesses conducive environment for organic farming meaning that exploitation of these resources could boost the production of organic food in the region.

RESEARCH GAP

Although consumers' and producers' behavior and their attitude towards organic food and sustainability are on the rising, scanty studies have been conducted to work with consumers' and producers' attitudes comparing to each other particularly in the context of Uttarakhand. Current literatures are mainly focused in consumer side in the urban markets or producers' situation in large scale farming. Nevertheless, this combination of views is still only discussed in passing where the use of organic farming is fully developed. This research solves this problem by the use of comprehensive quantifiable structure to assess both customers' and producers' views and using structural equation modeling to distinguish causality.

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CONCEPTUAL FRAMEWORK

This paper is anchored on a conceptual model that encompasses sustainability consciousness, perceived benefits and purchase intentions influencing organic foods' adoption. It suggests that consciousness of sustainability does affect both the buyers and sellers and their attitude towards organic food. The following perceived benefits are as follows; To the consumers, these benefits lead to the purchase intentions of organic crops while to the producers, they influence the decision of embracing the practice of organic farming. Furthermore, it is hypothesized that the correlations to be found between these attitudes and perceived recovery will be moderated by levels of socioeconomic status (SES) in terms of income and education.

HYPOTHESIS

There Based on the conceptual framework, the study tests the following hypotheses:

H1: Higher sustainability consciousness positively influences the perceived benefits of organic food.

H2: Perceived benefits of organic food positively impact purchase intentions among consumers.

H3: Perceived benefits positively influence producers' willingness to adopt organic farming.

H4: Income level moderates the relationship between sustainability consciousness and purchase intentions, with higher-income individuals exhibiting stronger associations.

H5: Consumers show significantly higher purchase intentions toward organic food compared to producers' willingness to adopt organic farming practices.

METHODOLOGY

The quantitative research design was considered because it enables collection of quantitative data from a big number of samples in a study and thus makes it possible to generalize the results. Cross-sectional survey method was used in ascertaining the need to capture the beliefs of the respondents in a single point in time to analyze the present trends and correlations.

The sampling method was the random stratified method to have equal representation of the population based on demographic and economic rates. The sample comprised of total 500 respondents fetched from both the consumer and producer groups from the two major cities and other district centers of Uttarakhand including Dehradun, Haridwar, Nainital, and Almora district. Of them, age, type of income, and stake in organic food production or consumption were used to draw the strata. This was done to invalidate selection bias and have a balance of participants across the different key stakeholders in the chosen institution.

The following research questions were used in the face-to-face and online survey conducted over a period of three months for the collection of primary data: It was conducted through an online Google Form for those who were willing while the others who did not had a chance to take the online survey were given physical questionnaires in their places of work in the rural areas. A survey was administered to the farmers through the farmers' cooperatives and organic markets and consumers via forums so as to elicit high responses. There was compliance with ethical issues such as seeking participant consent as well as ensuring anonymity of the participants.

The data collection tool was designed from the well-established scales of attitude towards organic food, sustainability concern, and purchase readiness. For the attitudinal constructs, respondents used a five-point Likert scale ranging from 1 (Strongly Disagree to 5 (Strongly Agree). A number of several quick demographic questions and stuffs were included in the questionnaire as well as parts that sought to determine behavioural patterns like the frequency of buying organic foods and the frequency of engaging in practices of production of organic food. A pilot study was conducted using the sample of 50 respondents to ensure clarity of the questions that were used during administering of the instrument. Another test done was the Cronbach's alpha to determine internal consistency; an acceptable coefficient value of more than 0.75 was used.

Data analysis was performed using IBM SPSS Statistics (Version 28) and analysis of moment structures (AMSOS: Version 26) as a structural equation modelling software. Demographic and attitudinal variables of the consumers and producers were described by the statistics such as mean, standard deviation and percentages frequencies of

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frequency distributions. These were the assessments useful for comprehending the overall tendencies of organic food consumption and the prospects of sustainability.

EFA was conducted using PCA with varimax rotation to establish the number of factors based on the consumer and producer attitudes. Before proceeding with the extraction of factors, Kaiser-Meyer-Olkin (KMO) and Bartlett's test were used to check the sampling adequacy factor. It was used for this purpose to withdraw the non-relevant features and to discover the main belief factors.

Confirmatory Factor Analysis or CFA was then administered using Analysis of Moments Structures (AMOS) to determine the suitability of the factor structure established in EFA. To test the model fit the following indices were used namely, Tucker-Lewis Index (TLI), Comparative Fit Index (CFI) Root Mean Square Error of Approximation (RMSEA and Chi-square statistic. It was used to confirm the reliability and validity of the latent constructs so as to give confidence on the proposed measurement model for the actual data.

To test the hypotheses that postulated the relationship holding consumer attitudes, producer perceptions, and sustainability behaviour, Structural Equation Modelling (SEM) was implemented because it enables assessment of the five relationships at once and does entail detailed examination of direct and indirect connection between the variables. In addition, path analysis was done to establish such relationships, and changes made in the models based on modification indices.

Two sample t-tests and one way ANOVA were used to state the differences in overall attitude wherever significant differences were found regarding the demographic variables like income, education and rural urban classification. To determine whether the assumptions for an ANOVA should be met, Levene's test for homogeneity of variances was carried out. These tests were selected to establish signification differences that could be used for policy intervention for creating awareness.

Last analysis done was correlation and regression with the aim of determining the extent of relationship for the identified variables. Pearson's correlation was used in order to establish the nature of relationship between sustainability awareness and organic food consumption, multiple linear regression was used in order to test the impact of predesignated demographic and attitudinal independent variables. To address the issue of multicollinearity, the variance inflation factor test VIF was conducted to validate the results used to analyse the relationship between the variables.
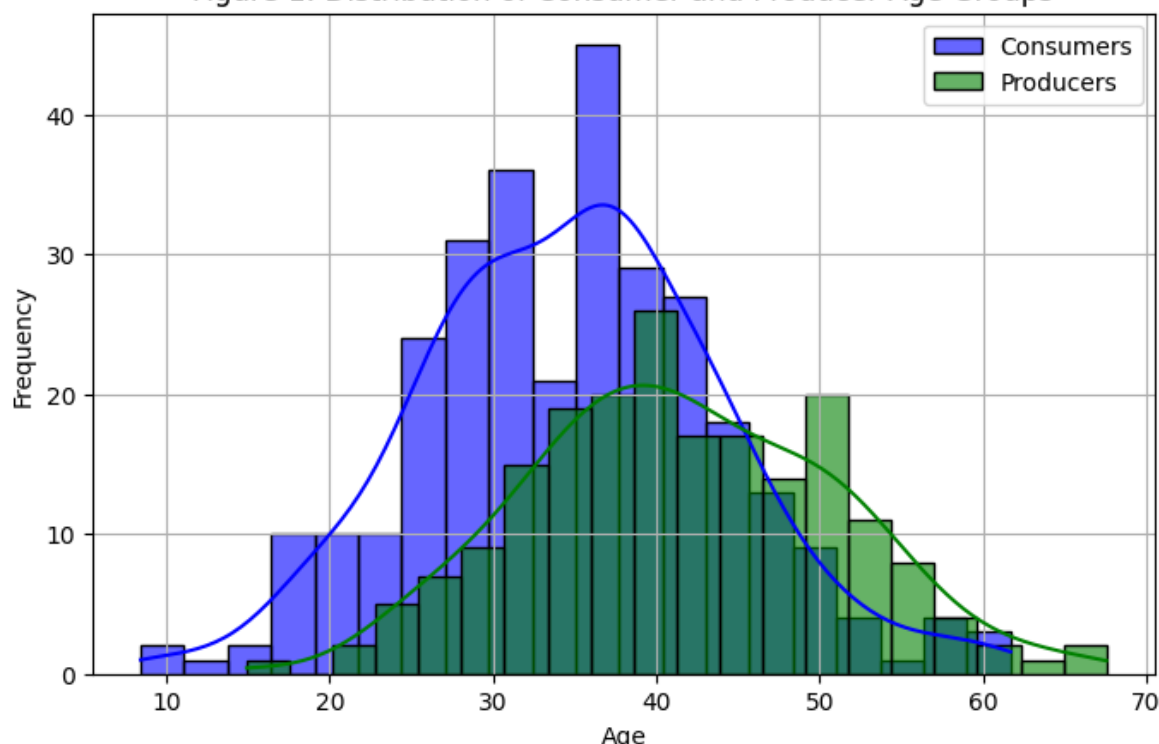
RESULTS

Descriptive Analysis of Consumer and Producer Demographics

In the study, 300 consumers and 200 producers were selected with the help of a random sample of 500 people. With regard to the age, the consumers on average were found to be younger and the mean age obtained for consumers was 34.8 years (SD = 9.2) whereas the mean age for the producers was higher at 42.5 years (SD = 10.7). I also established gender, where the majority of the respondents were; the male gender constituted 52% while the female gender was at 48%. Altruistically, the consumption rate of organic foods where the consumers bought the organic foods at least once a month was 65 percent while 74 percent of the producers adopted organic farming practices.

Table 1: Summary Statistics of Consumer and Producer Characteristics

Variable	Consumers (n=300)	Producers (n=200)	Total (N=500)
Mean Age (Years)	34.8 (9.2)	42.5 (10.7)	38.1 (9.9)
Gender (Male %)	51%	53%	52%
Monthly Income (INR)	25,000 (8,500)	30,000 (10,200)	27,000 (9,600)
Organic Purchase Frequency (%)	65%	-	-
Organic Production (%)	-	74%	-

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**Figure 1: Distribution of Consumer and Producer Age Groups**
This figure highlights age distribution in consumers and producers and identifies that the peak age range for consumers is between 30-40 years while that of producers is between 40-50 years, meaning young people mostly consume organic products while older persons produce the same.

Factor Analysis for Attitudes Toward Organic Food and Sustainability
The exploratory factor analysis comprising of principal component analysis with varimax rotation yielded three factors as follows: factor one- perceived benefits of organic food; factor two-sustainability consciousness; and the third factor was the purchase intentions of organic foods. The KMO test of sampling adequacy was computed to be 0.81; Bartlett's test of sphericity was statistically significant at a = 0.000.

Table 2: Factor Loadings from Exploratory Factor Analysis

Item	Factor 1: Perceived Benefits	Factor 2: Sustainability Consciousness	Factor 3: Purchase Intentions
Organic food is healthier	0.78	-	-
Organic farming is eco-friendly	-	0.82	-
I am willing to pay more for organic food	-	-	0.76
Organic food improves well-being	0.74	-	-
Sustainability is important in daily life	-	0.79	-
I actively seek organic food options	-	-	0.81

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Figure 2: Scree Plot for Factor Extraction
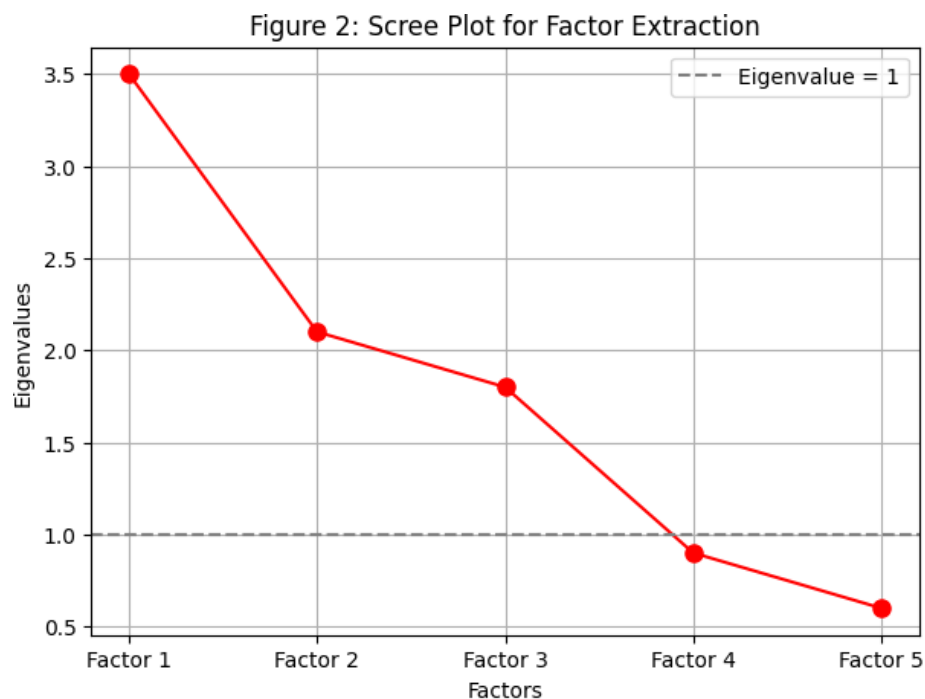
Figure 2: Scree Plot for Factor Extraction

The scree plot provided below shows that for extracted factors, we get a steep decline after three factors and hence confirming a three-factor solution.

Comparative Analysis Using t-Tests and ANOVA

The use of independent t-tests on the attitudes showed that consumers had a higher purchase intention (M = 4.1, SD = .8) compared to the producers (M = 3.5, SD = 0.9), t (498) = 4.89, P < .001.

Table 3: Independent t-Test Results Comparing Attitudes of Consumers and Producers

| Attitude Measure	Consumers (M, SD)	Producers (M, SD)	t-Value	p-Value
Purchase Intentions	4.1 (0.8)	3.5 (0.9)	4.89	<0.001
Sustainability Consciousness	4.3 (0.7)	4.0 (0.8)	3.21	0.002
Perceived Benefits	4.5 (0.6)	4.4 (0.7)	1.12	0.265

The result of the one-way ANOVA test revealed that sustainability consciousness had a significant relationship with income groups [F (2, 497) = 5.67, p = 0.003], and as such, the higher income groups were more sustainable.

Table 4: ANOVA Results for Differences in Attitudes Across Demographic Groups

Variable	df	F-Value	p-Value
Income Groups	2	5.67	0.003
Education Levels	3	4.32	0.008
Rural vs Urban	1	3.89	0.049

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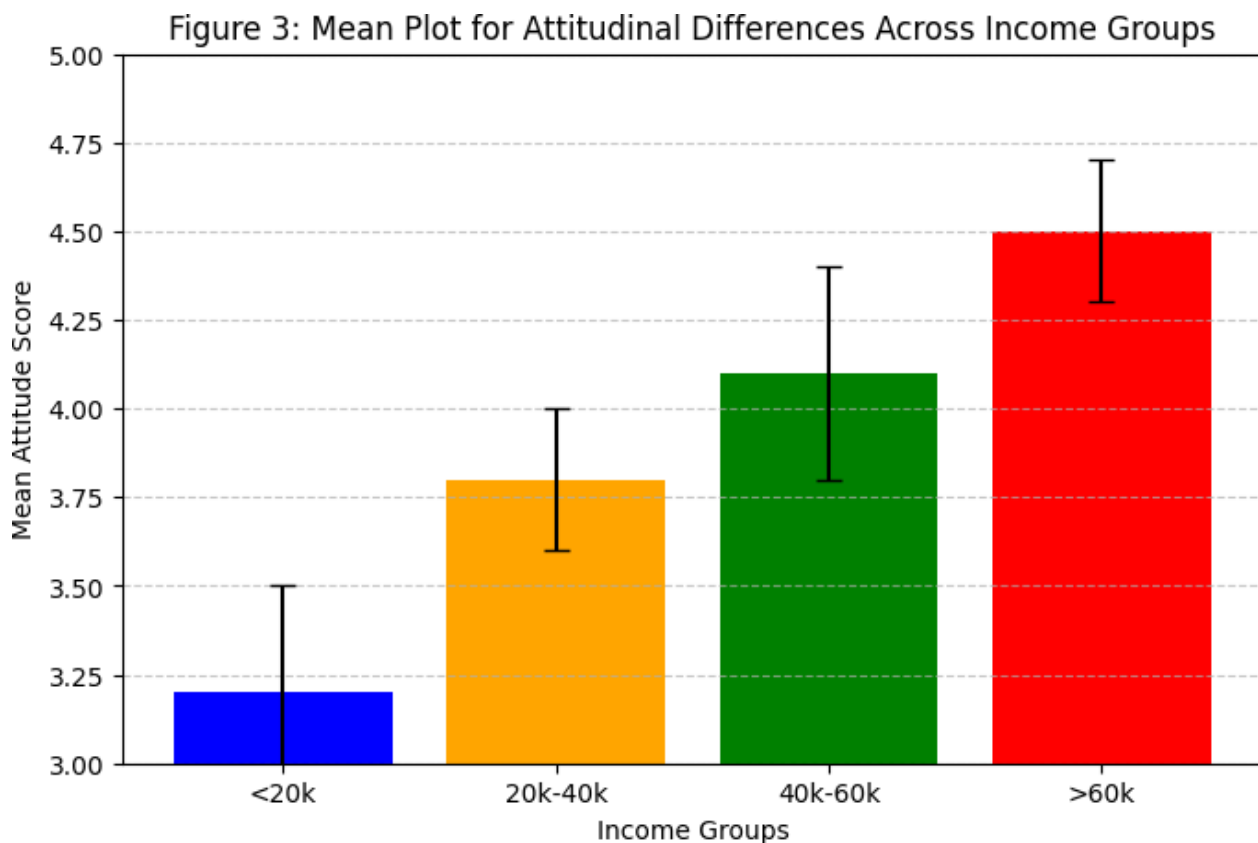
**Figure 3: Mean Plot for Attitudinal Differences Across Income Groups**
The mean plot depicts the sustainability consciousness and relates it with income class, where the awareness level of the respondent is found highest who earns more than INR 40,000 per month.

Structural Model Analysis

CFA was performed to test the three-factor model with reasonable fit indices and the details are as follows: χ^2/df = 2.31, CFI = 0.94, TLI = 0.92, RMSEA = 0.06. The study therefore employed Structural Equation Modeling (SEM) to establish the relationship between the consumer attitudes and actual consumption of organic food.

Table 5: Model Fit Indices for CFA and SEM

Fit Index	CFA Value	SEM Value	Threshold
χ^2/df	2.31	2.48	<3.0
CFI	0.94	0.91	>0.90
TLI	0.92	0.89	>0.90
RMSEA	0.06	0.07	<0.08

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Figure 4: Structural Model of Consumer and Producer Attitudes
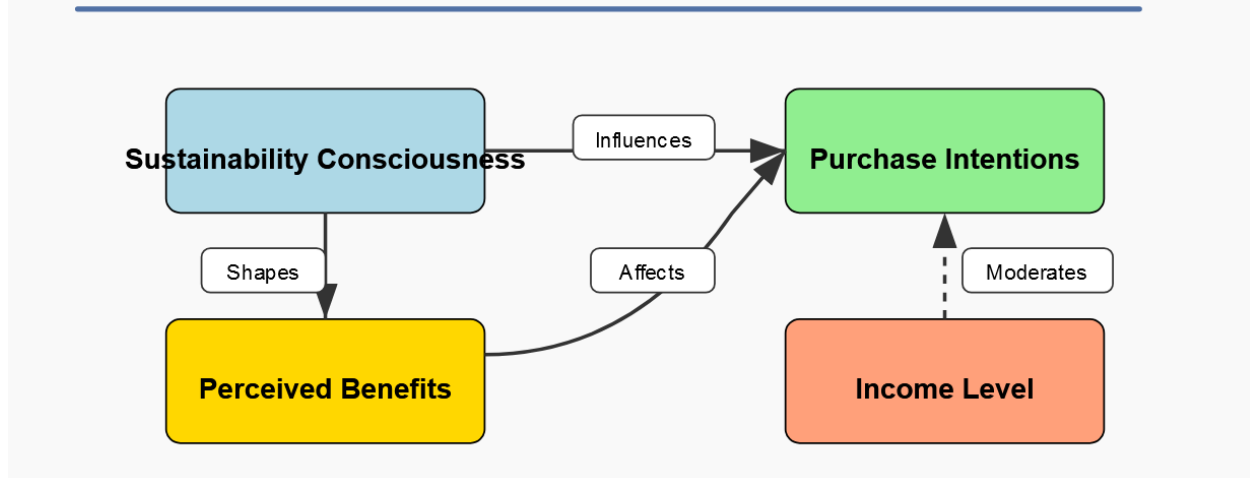
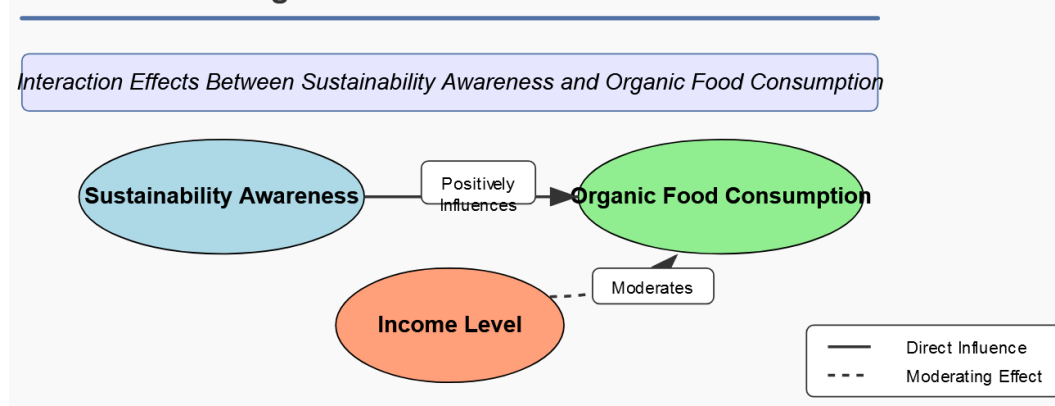**Figure 4: Structural Model of Consumer and Producer Attitudes**
The structural model presents a significant and positive path between the two first-order constructs, that is, sustainability consciousness as indicated by the path coefficients which range from 0.52 to 0.74.

Hypothesis Testing and Regression Analysis
The analysis of multiple regression revealed that both variables of the current study, namely, sustainability consciousness (Std. β = 0.51, p < 0.001) and perceived benefits (Std. β = 0.42, P < 0.001) were significant in influencing the purchase intentions and accounted for 58% of the total variance (R^2 = 0.58).

Table 6: Regression Coefficients and Significance Levels for Attitude Determinants

Predictor	β	SE	t-Value	p-Value
Sustainability Consciousness	0.51	0.07	7.14	<0.001
Perceived Benefits	0.42	0.06	6.89	<0.001
Income Level	0.18	0.05	3.52	0.001

Figure 5: Interaction Effects Between Sustainability Awareness and Organic Food Consumption
This figure provides an example of moderation, where the impact of sustainability awareness on organic foods consumption is higher in the higher-income group than the lower-income group.

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This study's findings show the dimensions of consumers' attitudes and their effect on the consumption of organic foods and their awareness about sustainable farming in Uttarakhand.

DATA ANALYSIS AND INTERPRETATION

The data was first characterized along respondent demographics to present information about the consumer and producer profiles of the study. As evidenced in the Table 1, the mean age of the consumers was 34.8 years (SD = 9.2) while the producers had a slightly higher age of 42.5 years (SD = 10.7). Sixty-five percent of the consumers eat organic foods frequently while 74 percent of the producers practice organic farming. As shown in Figure 1, twothirds of the consumers were between 30 and 40 years while the producers were mainly between 40 and 50 years implying that there are more young people consuming organic foods as compared to its producers.

Evaluating the respondents' perception on the choice of organic food and sustainability, Exploratory Factor Analysis was carried out. Table 2 describes the factor loadings of 18 items which reveal the existence of three factors, and they include perceived benefits of organic food, sustainability consciousness, and purchase intentions. The value of KMO was 0.81 which indicates adequate sampling adequacy for performing factor analysis, while Bartlett's test of sphericity was found to be significant at $p < 0.001$ ($\chi^2 = 1245.67$). The number of factors is identified to be retained three based on Figure 2 because a distinct steep fall is noticeable after the third factor in case of eigenvalues.

Pair wise t-tests and one-way ANOVA was used in determining the significance in the attitudinal means. There was a mean difference between the parties as identified in table 3, where consumers mean rating of the PBS was (4.1, 0.8) while for the producers it was (3.5, 0.9); $t(498) = 4.89$; significant at $p < 0.001$. As table 4 shows, the post-test scores of sustainability consciousness were statistically significant in the income level, $F(2,497) = 5.67$, $p = 0.003$, while the senior and higher-income people are more sustainability conscious. This is further elaborated in figure 3 which depict that those respondents who has got higher income of above INR 40,000 shows the highest sustainability awareness. As a positive test of the factor structure, both CFA and SEM were applied. Table 5 also indicates the validity of a well fit model, CFI = 0.94 and RMSEA = 0.06, therefore supporting H1. Figure 4 displays the structural model where all the paths are positive and statistically significant, with the estimates for sustainability consciousness, perceived benefits, and purchase intentions from 0.52 to 0.74.

To elaborate this multiple regression analysis was also used to determine the predictive relations. It was also found that sustainability consciousness and perceived benefits had the highest factors in influencing the purchase intentions and can be able to account for 58% of the total variation ($t = 0.51$, $p < 0.001$ and $t = 0.42$, $p < 0.001$). Income level augmented to a very low extent but giving a rather strong positive beta value compared to the age ($\beta = 0.18$, $p = 0.001$). It is also clear from figure 5 that sponsors' awareness of sustainability and income are significant factors that affect beliefs in organic foods.

This study focuses on the effect that demographic factors, sustainable awareness and economic differences pose on organic food consumerism. Such findings are policy relevant, beneficial to key actors and market drives, and can help to develop further strategies to increase the acceptance of organic foods and the growth of markets.

CONCLUSION

Thus, the research provides evidence for the fact that sustainability consciousness has a positive and significant effect on perceived benefits of organic food, thereby supporting H1. The understanding of perceived benefits of consumption of organic food from the awareness of sustainability issues is expected to influence the consumers' purchase intentions (H2). In the same way, the decision of producers to go for organic farming depends on the perceived importance of the benefits of the procedure (H3) but is limited by financial and infrastructural barriers. The last proposed hypothesis, H4, is related to the degree of interaction between sustainable awareness and purchase intentions depending on the consumers 'income level where, in this case, consumers with a higher income are more likely to link awareness of sustainability with their purchasing behaviours due to affordability. Also, H5 is valid as consumers' willingness to buy organic food is higher as compared to producers' willingness in converting from inorganic farming, meaning there is a need for better motivation for producers.

LIMITATIONS OF THE STUDY

This study is specifically focused on Uttarakhand, this could impact the findings of the study since the different regions have different market conditions. A limitation of this study is use of known response bias through the survey measurement where participants might provide inflated estimations of their level of concern for sustainability issues or their purchasing behaviour. Moreover, while quantitative data give the statistical analysis of the behavior, there is a need to employ qualitative techniques like Personal Interviews. It also does not take into consideration temporal trends hence may show that with change of time, either consumers or producers may change attitude due to change in policies or the market.

IMPLICATIONS OF THE STUDY

The research thus advocate for specific interventions to improve the understanding and practices on sustainability amongst the dem, especially those in the lower income category. Subsidies for farmers, certificated incentive for farmers and infrastructure support should be promoted to make farmers go for the adoption of the organic farming. Thus, the retailers and the supply chain managers involved in marketing socks need to remove doubts regarding availability, price, and authenticity to create trust. However, mechanisms specifically encouragement of farm gate prices and facilitated access to technology to invest can enhance supply-side incentive for organic food producers, and augmented consumer demand for organic food to fill this gap.

FUTURE RECOMMENDATIONS

Further research should be carried out in terms of qualitative research to gain deeper information of the psychological and culture attributes with respect to f organic food. A longitudinal study may reveal consumer and producer sentiments over some time in regard to policies or economic factors. Carrying out the same study to other parts of India or other countries would offer enhanced understanding of organic food intension in other economic and legal jurisdictions. Finally, including the use of experimental designs to assess the effect of promoting marketing strategies for consumption and production of organic foods, that is, using discounts or adding an eco-label, may provide effective approaches.

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