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MODERATION EFFECT OF KNOWLEDGE ON ORGANIC FOOD ACCEPTABILITY AMONG PERSONNEL OF IBADAN-BASED AGRO RESEARCH INSTITUTIONS

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ABSTRACT

The use of agrochemicals in conventional farming has come with its benefits and also its baggage in the form of consequences for human health and serious environmental hazards. Organic food, which serves as an alternative remedy to this problem, is not quite popular in Nigeria's food market. This study examined the role knowledge of organic food plays in the determination of its acceptability. A multistage sampling procedure was used to select 203 academics and researchers from 12 out of 22 agricultural research and educational institutions within the Ibadan metropolis. A structured questionnaire was used to elicit responses on information about knowledge of organic food and the determinants of acceptability, and the data was analyzed using the partial least squares structural equation model (PLS-SEM). Results revealed Knowledge of organic food significantly moderated the relationship between the availability (β = -0.443), (T value =2.949), indicating knowledge increases, affecting the acceptability of organic food to decrease, The acceptance constraints (β = 0.25), (T value =2.784) indicated that as knowledge increases, the effect of organic food acceptance constraints on organic food acceptability increases. The perceived benefit (β = 0.34), and (T value =1.961) indicates that as knowledge increases, the effect of perceived nutritional and health benefits on organic food acceptability increases. The study recommended that organic food consumers strive to increase their knowledge about organic food, such as the nutritional and health benefits of organic food and not base their acceptance solely on the availability of organic food products. It also suggested learning about the constraints associated with organic food availability by doing so, they may have a better understanding of why these constraints exist, and may be more likely to accept and appreciate the benefits of organic food products.

Keywords: Organic food Acceptability, Structural Equation Modeling, Moderation effect and Climate Change.

INTRODUCTION

The global quest for food yield increases, in the face of booming world population has led to the evolution of many technologies (Worldometer, 2022). Synthetic and inorganic agricultural inputs, such as agrochemicals and fertilizers, are good examples (FAO, 2017). These innovations have had an impact by improving not just the productivity but also the yield of crops (Brian Halweil, 2007). The impact of these innovations, on the other hand, is not all positive. They mostly function at the expense of either man, plant, the environment, or all at the same time (Hashimi et al., 2020) with their active content exerting an irreparable impact on all non-targeted substances. They exploit conventional farming mostly with some vices, thereby providing an unarguable benefit at cost too heavy to bear. They have therefore become a major source of pollution for the environment and a complication for public health (Biswas et al., 2014).

The continuous loss in quality of most food products from conventional farming is not only felt in the form of taste, appearance, and depth of nutritional value loss (Richter et al., 2015), it has also been traced to other forms of consequences, such as the occurrence of chronic terminal diseases of late, with virulence, which, to a degree of fact, are unprecedented and not hereditary (Wimalawansa, 2015). The prevalence of these diseases has been traced to the recent increase in the uptake of synthetic agrochemicals (Sharma et al., 2017). Diseases such as cancer, neural disorders, birth defects, and reproductive and developmental anomalies have been traced to heavy use of some of these chemicals (Baranski et al., 2014). Other diseases such as mutagenicity and other health-related problems have either been directly or indirectly linked to the recent scaling up in the usage of agrochemicals and other yield-inducing technologies (Erhunmwunse, 2012 and Dabady et al., 2015).

Most consumers naturally grow the urge to crave a sustainable solution, closest indication of these cravings is the unconscious display of acceptance behaviors before acceptance decisions. These are attitudes such as the usual opting for foods with features that indicate they are not products of contaminated farming systems. These consumers are on the lookout for food features such as freshness, tenderness, turgidity, desirable taste, and healthy and attractive coloration. The preference for foods with a history of eco-friendly processes also forms part of some of the common behaviors of consumers. Ordinarily, acceptance of any product among consumers is determined by their perception of its benefits (Soroka et al., 2019) and their vulnerability to the threat the product neutralizes (Morris et al., 2012). It is determined by the financial capability of the consumers. This can be in the form of value attached to the product, as expressed in the amount the consumer is willing to pay relative to a close substitute (Kulikovski et al., 2010). An average low-income earner is likely to judge a product, if it attracts premiums like organic food, as expensive regardless of its benefit to his health or the environment. The value attached to the product here is borne out more by the cost implications of its price on their income than by the perceived benefit of the product. There is then a need to assess the attached value of a product in a population sample with above-average financial leverage for a premium-attracted product like organic food (Orji et al., 2012). A consumer with sound knowledge, and a positive perception of benefit but with very low purchasing power, will most likely value any expensive product and hence not accept it. Even the few who intended to buy, may not be willing to pay for it.

The extent of knowledge and practices of organic agriculture determines the perception people have of its potential and the advantages of its products. This is because unlike, other food products, organic food carries a premium, which sometimes can go as high as 100% of the price of the same product from conventional farming (Van Loo et al., 2011). The place of knowledge of the benefits of a product that is either novel or unpopular, like organic food, in food markets is crucial to its acceptance in the face of this premium.

Having been confirmed unpopular in the Nigerian market (Mgbenka et al., 2015), it is against the backdrop of the above that this study opines about the need to appraise the pivoting effect of knowledge in the relationship between all the above factors and the acceptance of organic food among consumers. Most important among these is the assessment of the role of this knowledge as to whether it moderates any of these established factors. This assessment is, however, mostly required among segments of the population with a tendency for superior knowledge. Firstly, the effect of the knowledge will possibly diverge among the general population, as most with little or no knowledge will attach a below-threshold value that may not justify the benefit of the product at the decision moment to accept or reject it. Also, the pioneer market for every unpopular product is always among people with an understanding of its advantages. The researcher therefore opined on the need to investigate the nexus of all the above factors as best among population segments with attributes that capacitate them with some leverages needed most for the target market. Advantages of not just the ability to pay but also better access to information and superior knowledge about the product. In the context of this study, this is assumed to be a higher educational attainment for researchers and academics in the field of agriculture.

Hypothesis of the study

(Ho) Knowledge of organic food negatively moderates each of the relationships between perceived benefits, attached values, availability, acceptance constraints, and acceptance of organic food, such that an increase in knowledge weakens the above relationship. The Health Belief Model (HBM), used to explain the acceptance of disease prevention strategies (Zhu et al., 2018 and –'"Abraham et al., 2014)) was adopted as a guide. Using the six modular constructs of perceived benefits, perceived barriers, perceived susceptibility, perceived severity, self-efficacy, and cue to action to explain the drivers of health-related behaviors (Janz et al., 1984). It is informed by the human desire to avoid a life-threatening situation and the eagerness to quickly escape it if it has already caught up.

Methodology

The study population is the senior staff of agriculture related education and research institutions in Ibadan metropolis. The list of all the senior academic, scientific and research officers, from grade seven and above, obtained from their staff directory was used as the sample frame for the study. The first stage of the sampling procedure involved the stratification of the institutions into two (2) categories: the research only institutions and research/educational institutions. The second stage involved the adoption of fifty percent (50%) from each of the two stratified groups of institutions above. This then resulted in the selection of seven (7) research only institutions and four (4) research/education institutions. The selected research only institutions are the National Horticultural Research Institutes, Idi-Ishin, Ibadan (NIHORT), Forestry Research Institutes of Nigeria Jericho Hill, Ibadan (FRIN),National Cereal Research Institutes, Moor Plantation, Ibadan (NCRI), Institute of Agriculture Research and Training Apata, Abeokuta Road, Ibadan (IAR&T), Cocoa Research Institutes of Nigeria, Idi-Ayunre, Ibadan (CRIN), National Center for Genetic Resources and Biotechnology, Moor Plantation, Ibadan (NACGRAB), National Agricultural Extension and Research Liaison Services, Moor Plantation Ibadan (NAERLS). The selected four (4) research/education institutions Federal College of Animal Health and Production Technology, Apata, Ibadan, Federal College of Agriculture, Apata, Ibadan; Faculty of Agriculture, University of Ibadan; Federal College of Forestry, Ibadan; and the Faculty of Natural and Renewable Resources, University of Ibadan. The final stage involved the adoption of the proportional fraction obtained between the population and the calculated sample size (between 7% and10%) of the senior staff from each of the selected institutions. The study employed the use of structured questionnaires to elicit information on respondents' socioeconomic characteristics, level of awareness and past experiences about organic products, level of knowledge and the perceived benefit of organic products, their availability, and willingness to pay for organic foods. The individual payout level to the premium price for each organic product will be verified. In addition, the questions were designed to obtain respondents' comments and suggestions to improve the organic product in the form of constraints they perceive are against its acceptance.

Moderation effect result

The analysis was carried out using Smart PLS software, version 3.0. All path coefficients were estimated using the PLS algorithm and their significance was assessed using bootstrapping with 600 replications at a significance level of 0.05. The interaction effect technique of testing moderation was adopted, as explained by Wu (2020). And as also used by Memon et al. (2019). The type of mediational effect was tested using a two-way interaction graph as used by (Razi et al., 2013)

As indicated in the table 1. below, with knowledge as a moderator on the tested moderation model, a significant moderation effect occurs between organic food availability and organic food acceptance, with a significant direct interaction with acceptance (p-value=0.003, T stat=2.949). The negative value of the unstandardized estimate (-0.443) of the interaction term indicates an inverse influence existing in the relationship when moderated by knowledge. The simple effect of availability on acceptance indicates a value of 0.134. This value indicates that at the average level of respondent's knowledge of organics, every unit increase in availability attracts an increase in acceptance of the food by 0.134. Whereas, at a higher level of knowledge a standard deviation unit increase), every unit increase in availability leads to changes in acceptance at the magnitude of the interaction (-0.443), which is calculated as; 0.134+(-0.443)=-0.309. This reveals a decrease in acceptance. On the contrary, for a lower level of knowledge, every unit increase in availability changes acceptance of the food by the magnitude of the interaction term, calculated as; 0.134-(-0.443) =0.577, which reveals an increase in acceptance by 0.577.The interpretation of this is that, as the level of knowledge increases, the effect of availability on organic food acceptability decreases. This suggests that consumers who are more knowledgeable about organic food may not base their acceptance solely on the availability of organic food products.

It can also be interpreted to mean that an increase in knowledge level among respondents, inversely moderates the relationship between availability and organic food acceptance. This was observed in a trend of a decrease of -0.309. This can be explained by the loss of trust in the quality of organic food by consumers with good knowledge of its process. This is especially true whenever organic food becomes unexpectedly available. This can be corroborated by the affirmation that knowledge of organics negatively correlates with trust units goodness (Erasmus et al., 2020).

Knowledge also moderated significantly, the relationship between organic food acceptance constraints and organic food acceptance, with a direct interaction with acceptance significant at (P-vale=0.001, T stat=2.949). The positive value of the unstandardized estimate (0.25) indicates a direct influence existing in the relationship when moderated by knowledge. The positive coefficient value indicates that as knowledge increases, the effect of organic food acceptance constraints on organic food acceptability increases. This suggests that consumers who are more knowledgeable about organic food may have a better understanding of the constraints associated with organic food, and therefore be more likely to accept organic food despite these constraints.

The simple effect of acceptance constraints on acceptance indicates a value of 0.164. This value indicates that at the average level of respondents' knowledge of organic, every unit increase in acceptance constraints attracts an increase in acceptance of the food by 0.164. Whereas, at a higher level of knowledge (a standard deviation unit increase), every unit increase in acceptance constraints leads to changes in acceptance at the magnitude of the interaction (0.25), which is calculated as 0.164+0.25 = 0.414. This is a positive increase in acceptance of 0.414. On the other hand, at a lower level of knowledge, a unit increase in acceptance constraints produces a change in acceptance to the weight of the interaction term, calculated as ; 0.164-0.25= -0.086 to reveal a decrease in acceptance by 0.086. The interpretation to this is that, knowledge directly moderates organic food acceptance among consumers at varying levels of constraint. The moderation, however, is such that, at a high level of knowledge, even when acceptance constraints increase, acceptance still increases by 0.414. On the other hand, at low knowledge levels an increase in acceptance constraints reduces acceptance by 0.086. The implication of this is that, as knowledge of organic increases among the respondents, the effect of acceptance constraints on acceptance becomes weaker. This can be corroborated by the presumed inverse correlation between consumption constraints and knowledge of organic food (Bardhan et al., 2019).

Knowledge also moderated the relationship between perceived nutritional and health benefits on organic food acceptance. The direct interaction with acceptance is significant (P-value=0.05, T stat=1.961). The positive value of the unstandardized estimate (0.34) of the interaction indicates a direct influence existing in the relationship when moderated by knowledge. The positive coefficient value indicates that as knowledge increases, the effect of perceived nutritional and health benefits on organic food acceptability increases. This suggests that consumers who are more knowledgeable about organic food may have a better understanding of the nutritional and health benefits of organic food, and therefore be more likely to accept and appreciate these benefits.

The simple effect of perceived nutrition and health benefits on acceptance on the other hand, indicates a negative value of -0.061. This value indicates that at the **average level of respondent knowledge** of organic foods, every unit increase in perceived nutrition and health benefits attracts a decrease in acceptance of the food by 0.061. Whereas, at a **higher level of knowledge**, every unit increase in perceived nutrition and health benefit leads to changes in acceptance at the magnitude of the interaction (0.34), which is calculated as; -0.061+0.34) = 0.279. This reveals an increase in acceptance of 0.279. On the contrary, at a **lower level of knowledge**, every unit increase in perceived nutrition and health benefit changes acceptance of the food by the magnitude of the interaction term, calculated as; -0.061-0.34) = -0.401. This reveals a decrease in acceptance by 0.401. The interpretation of this is that knowledge moderates the relationship between perceived nutrition and health benefits and organic food

acceptance among consumers. It does this at a trend of increase of 0.279 in the unit of acceptance for every unit increase in their perception of the food as being nutritional and of health benefit when there is a high level of knowledge. On the other hand, when there is a low level of knowledge organic acceptance decreases by 0.401 for every unit increase in perceived nutrition and health benefits. In another way, this can be explained as follows: with low knowledge of organics, consumers do not perceive the food as being beneficial to them nutritionally and health-wise, such that this perception is rather making them buy less organic when their knowledge is lower. When their knowledge improves, their perception of the nutrition and health benefits of organic food makes them buy it more. This can be corroborated by the positive correlation confirmed to exist between perceived nutrition, health benefits and acceptance of organic food (Magnusson et al., 2003).

From Fig 1 below, it can be observed that the effect of knowledge on the relationship between organic food availability and its acceptance is mixed. Consumers with a low level of knowledge tend to accept organic food more as it becomes more available, while those with high level of knowledge accept it less with higher availability. The possible explanation can be that these consumers with a high knowledge of organic food may have less confidence in the process of organic food production when it floods the market, they have less trust in new organic farmers turning in more organic product to the market, hence they buy less of the market quantity. This type of moderation effect can be said to be antagonistic moderation (Corraini et al., 2017), as the increase in the moderator leads to a negative association between the independent and dependent variables while the decrease leads to a positive association at the same rate as the dependent variable and with the same gradient to the slope.

Fig 2 also provided a similar antagonistic moderation effect (Wu, 2018) of knowledge on changes in perceived level of constraints to the acceptance of organic food. The peculiarity of this scenario is that, the graph revealed that consumers with a high level of knowledge accept organic food more even when the constraints they face in getting it increase, while consumers with a low level of knowledge accept the food less when the constraints, they face in getting it increases. The explanation for this can be traced to availability and high cost as constraints were the highest ranked in the study. And with the study selecting respondent researchers and academics with above-average income, this is like controlling for knowledge and purchase capability. The majority of the respondents with high knowledge will understandably pay for an organic product that others perceive as expensive. They will have the capacity and network to source it when it is not available, while low-knowledge consumers who probably attach less value to the food will immediately opt for conventional food at a slight perception of excessive price and scarcity.

Figure 3 revealed that knowledge also plays another antagonistic moderation effect on the perceived nutritional and health benefits of consumers and their acceptance of organic food. Consumers with high levels of knowledge increase their acceptance as their perceived nutritional benefit increases while consumers with low level of knowledge reduces their acceptance as their perceived nutritional benefit increases. Hence, a high level of knowledge has a positive effect on the relationship between acceptance and perceived nutritional benefit, just as a low level of knowledge has a negative effect on the relationship between acceptance and perceived nutritional benefit. This, by implication, means that consumers with a high level of knowledge accept the organic food more as they perceive it been more beneficial to them nutritionally and health-wise. While consumers with low level of knowledge accept organic food less even as their perception of its nutritional benefits increases. This is probably due to the value they attached to the food by the consumers with a higher level of knowledge.

CONCLUSION, SUMMARY AND RECOMMENDATION

The result revealed that knowledge plays a potentially important role in the acceptability of organic food products, particularly in relation to the perceived nutritional and health benefits of these products. By increasing knowledge and awareness about these benefits, organic food consumers can make more informed decisions, and organic agriculture stakeholders can develop more effective strategies to promote organic food products. In relation to the constraints associated with organic food production and distribution, by increasing knowledge and awareness about these constraints, organic food consumers can make more informed decisions.

Organic food consumers should try to increase their knowledge about organic food by accessing educational resources, attending organic workshops, and using online resources, to understand the benefits of organic food and how it can impact their health and the environment. By doing so, they can make more informed decisions and choose organic food products based on a holistic assessment of the product. Organic agriculture stakeholders should not solely rely on the availability of organic food products as a marketing strategy by assuming their benefits will market them, but should intentionally focus on increasing knowledge and awareness about the benefits of organic food products through the encouragement of advertisement, sponsored exhibition shows, and enlightenment programmes, to create a more informed and knowledgeable consumer base. They should also emphasize the benefits of organic food products, by emphasizing the specific nutritional and health benefits, and by providing consumers with accurate and up-to-date information about these benefits, despite any identified constraints. This can help to create a more informed and understanding consumer base, which in turn may lead to increased acceptance of organic food

The study recommends that organic food consumers should strive to increase their knowledge about organic food, including the constraints associated with organic food production and distribution. By doing so, they may have a better understanding of why these constraints exist and be more likely to accept and appreciate the benefits of organic food products. They should also not solely rely on the availability of organic food products in making their purchase decisions. It is important to also consider other factors, such as the nutritional and health benefits, as well as the price and taste of organic food products. This can be done by researching and reading about the specific benefits of organic food, as well as consulting with healthcare professionals and nutritionists who can provide expert advice on the subject.

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Table 1: The table of the moderation effect of knowledge on the relationships in the research model

Knowledge As A Moderator	Unstandardized Beta coefficient	T Statistics (|O/STDEV|)	P Values
Attached Value -> Acceptance	**0.212**	**5.227**	**0.001**
Availability -> Acceptance	**0.134**	**3.875**	**0.001**
Constraints -> Acceptance	**0.164**	**4.758**	**0.001**
Environmental benefit -> Acceptance	**-0.188**	**4.194**	**0.001**
Knowledge -> Acceptance	**-0.013**	**0.332**	**0.74**
Mod_Knowledge *Availability -> Acceptance	**-0.443**	**2.949**	**0.003**
Mod_Knowledge*Constraint -> Acceptance	**0.25**	**2.784**	**0.006**
Mod_Knowledge*Nutrition&health benefit -> Acceptance	**0.34**	**1.961**	**0.05**
Nutrition&Health benefit -> Acceptance	**-0.061**	**1.344**	**0.18**

Moderation interaction graphs of knowledge as a moderator for different relationships in the model

To confirm the types of moderation effects identified above to be statistically significant, there is a need to check for the interaction on a two-way moderation interaction graph; as informed by Memon et al., (2019). The Microsoft Excel worksheet used in conducting these slope difference tests was downloaded online at www.jeremydawson.co.uk/slopes.htm 2. Following the procedure used by Dawson et al., (2006), all the possible moderation effects that have earlier been confirmed to be statistically significant for each variable in the research model were tested against each other, and the plotted graphs are shown below.

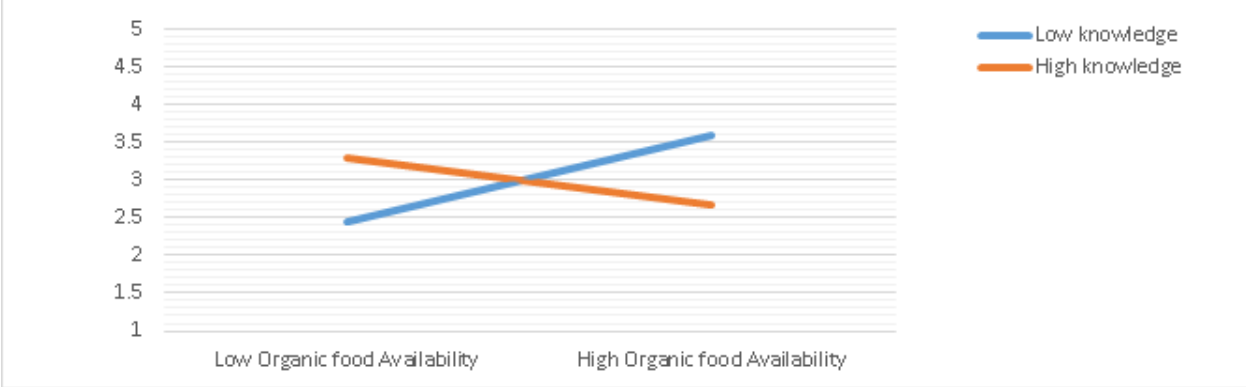

Fig 1. The graph shows the dispersion of the relationship between availability and organic food acceptance, moderated by knowledge of organics

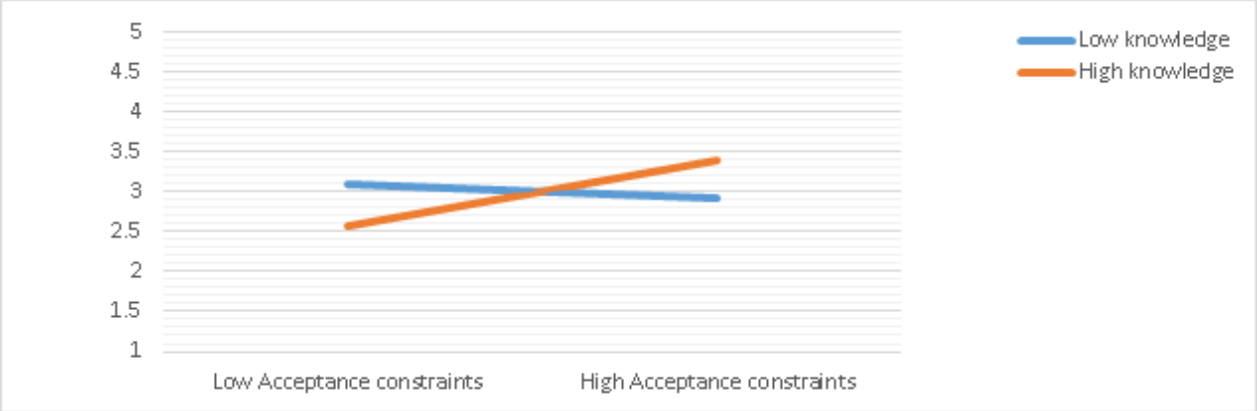

Fig 2. The graph shows the dispersion of the relationship between consumption constraints and organic food acceptance, moderated by knowledge of organics

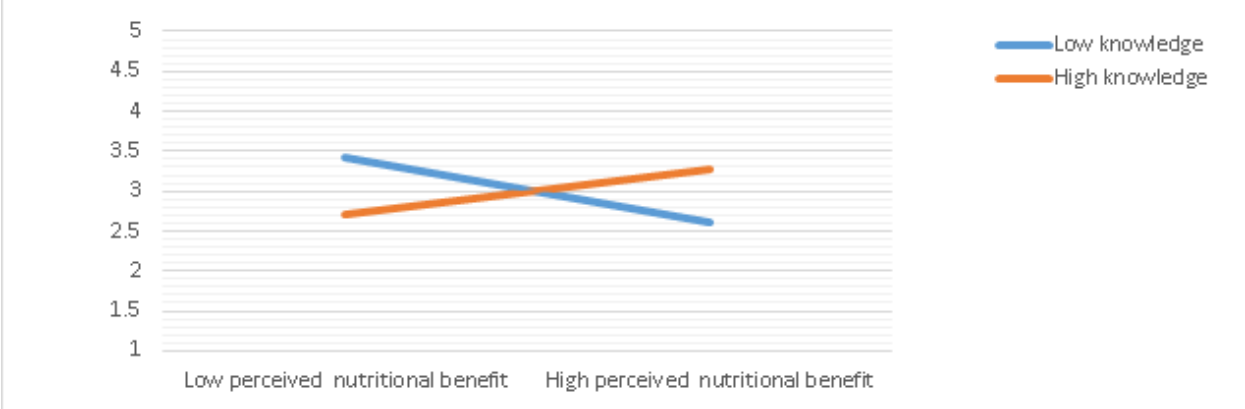

Fig 3. The graph shows the dispersion of the relationship between perceived nutrition and health benefits and organic food acceptance, moderated by knowledge