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Comparing the Cost of Organically and Conventionally Produced Foods in Supermarkets in the United Kingdom

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Abstract

The study compared the cost of foods produced organically and conventionally. An online data-based survey was conducted on four leading UK supermarkets; Asda, Tesco, Sainsbury's and Waitrose, Prices of fruits, vegetables, meats and processed foods were compared, as well as their origin of production. Results showed that organically produced foods were more expensive than conventionally produced foods, and differs between supermarkets ($P \leq 0.05$), and proportion of food sourced outside the UK. Also, a comparison between the average sample variance of both organic and conventionally produced foods against the means of each production method. As a result, Government and agricultural organizations should develop policies that promote organic agriculture as a sustainable farming practice, subsidize the costs of producing organic foods and promote local consumption and export. Such policy should be sustainable by ensuring guaranteed prices, market, increased outputs with little to non-environmental impact and in due course food security.

Keywords: Costs, organic and conventional foods, supermarkets, subsidize organic production, food policy

Introduction

The growing perception of the choice of food produced either organically or conventionally has prompted studies to compare their costs of production, and their supply and demand. Several studies (Schanczenski, (2019) and Durham and Mizik, (2021) have assessed whether there is difference between organic and conventional foods from the perspective of both the producer (supply side) and the consumer (demand side). Organic foods are food produced without the use of fertilizers, pesticides, herbicides, and other synthetic chemicals. It highlights dimensions such as biological or natural production systems, and green and or environmental friendliness (Zewide and Sherafu, 2021). This system of food production enhances soil biological activities, biodiversity, and ecosystem health, which encourages the natural breeding of animals, environmental and land protection to avoid pollution. Whereas, conventionally produced foods encourage the use of fertilizers, chemicals, and livestock additives for the production of foods, with little consideration to the environment and land (Sumberg and Giller, 2022). This system is feared to have

effects on soil fertility, contributes to pollution, destruction of biodiversity and impacts on agricultural food produced. This belief has led to an increasing consumer interest to organically produced foods, which can neither be verified as pesticide free. Zewide and Sherafu, (2021), stated; there is an increasing interest of organically produced food throughout the world, in response to concerns about conventional agricultural practices, food safety, human health, welfare, and environmental concerns.

The study compares the price difference of certain organically produced foods to their conventional counterpart, how they differ at top leading UK supermarkets, and their origin of production (imported/ native), in other to gain an insight into which aspect of food production is more expensive, the price difference between foods, how the price differs between supermarkets and similarity between the proportion of sourced foods.

The UK has one of the leading organic markets in Europe and worldwide with an estimated value of £605 million in 1999 to £3.05Bn in 2021, a 5.2% increase in 2021 and a 10-year consecutive growth (Soil Association Certification, 2022). These developments of organic markets were largely encouraged by the growing consumer interests, awareness and health consciousness, availability of support for converted farmers and supermarkets and the willingness of consumers to pay for premium products. As stated in Al Mutiri, and Al-Sowayan, (2021) willingness to pay for food is an exchange or self-sacrifice issued for the sole purpose of receiving a reward (goods and services), or just to avoid an undesirable condition. A consumer's willingness to pay for organic foods is usually based on the fact that organic foods are safer and possesses greater quality and nutritional benefits than their conventional counterparts. According to Wang, Pham, and Dang, (2020), the purchase of organic foods is usually referred to as consumers' concerns over quality, safety, and environmental consciousness.

According to Willer, and Lernoud, (2019) the term organic has a strong emotional resonance with consumers' health, nutrition, animal welfare and care for the environment. These issues and concerns are almost certainly a major motivator that drives consumers towards the purchase of organic products. The value of food safety drives organic consumers to pay higher prices than their conventional counterparts to reduce perceived risk. However, conventional consumers might also value such risks but are not willing to pay a higher price. (Wang, Pham and Dang, 2020). Also, when organic consumers are unsure of certain products type that they are about to purchase, they are usually unwilling to pay more than the standard price. The excess prices paid over or above a fair price that is justified by the true product value may be an indication of the demand for such a product. (Vigar, Myers, Oliver, Arellano, Robinson and Leifert, 2019).

Furthermore, the lifestyle and consumer choice (Organic foods or Conventional foods) of food are literary different. Organic consumers are more likely to purchase environmentally friendly products, and are willing to recycle, and grow their own produce, whereas conventional food consumers are not environmentally aware (Wang, et al, 2020). The relative importance of lifestyle, attitudes and beliefs is shaping public behavior toward type of food purchased. Sometimes there are consumers misperceptions that organically produced foods are healthier, more nutritious, and environmentally friendly than conventionally produced foods (Eva-marie, and Matin, 2018). This is not the case as there are no proven studies saying otherwise, as noted by Margherita, Donato, Nicoletta, and Daniella, 2020). Food labels are a major

determinant for the purchase of either organically or conventionally produced foods, but can also be misleading. Consumers of organically produced foods are more likely to rate food labels as an important factor used in deciding what food products they should buy. (Margherita, Donato, Nicoletta, and Daniella, 2020).

Methodology

Online qualitative Market Research was used to Purposively select TOP four (4) United Kingdom (UK) (Latitude 55.3781° N and Longitude 3.4360° W) leading supermarkets (Asda, Sainsbury, Tesco and Waitrose). A simple random sampling technique was then used to select four (4) food products namely; Fruits, vegetables, meat and processed foods, sold by the supermarkets, the cost of each product, type (organically produced or conventionally produced), and their origin (UK or Not UK) of production, from the websites of these supermarkets. Paired Sample T-test was used to analyze the data.

However, one major flaw in the research method is that less qualitative data might have been generated during the time taken to carry out the data gathering, as there might have been a price hike or reduction afterward. So, to reduce this effect randomization of the sample was necessary, as a common practice that on average will act to reduce the impact of confounding variables. (Cynthia, William and Rosalind, 2020).

Results and Discussion

Range in the Cost of Organically and Conventionally Produced foods

Figure 1 is a representation of the total range in the cost of organically and conventionally produced foods (fruits, vegetables, meat, and processed foods) sold in each of the supermarkets on a scatter graph, which helps highlight their variability on a 45° line. As indicated on the graph organically produced foods are more variable (expensive) than conventional foods, and the prices also differ between supermarkets. The result is in agreement with Zewide and Sherafu, (2021) who noted the increasing interest of organically produced food throughout the world, which is as result of concerns over conventional agricultural practices, food safety, human health, welfare, and environmental concerns, and Vigar, et. al, (2019), that the excess price paid over or above a fair price is justified by the true product value, and may be an indication of the demand for such product.

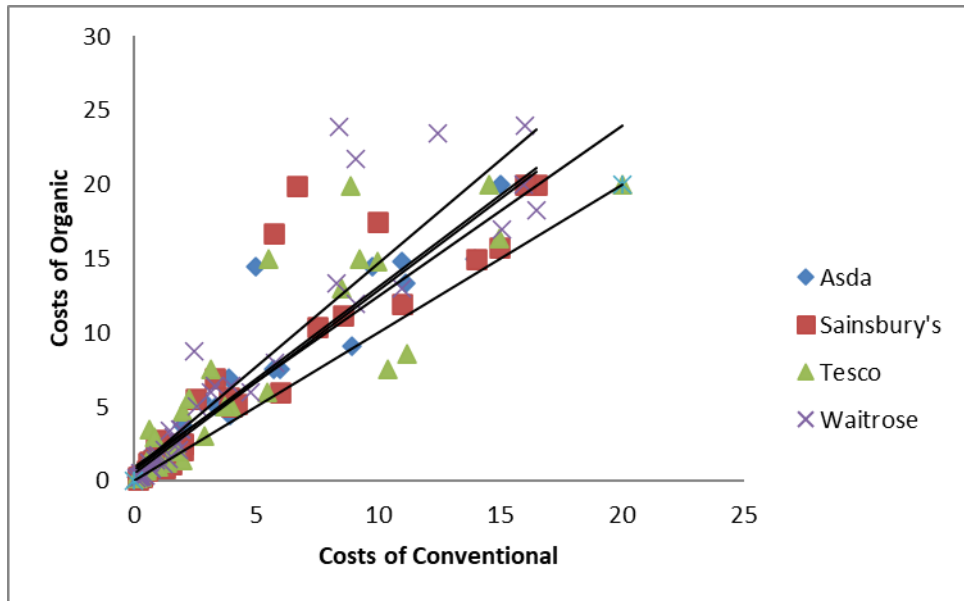


Figure 1: Scatter graph representation of the total cost of organically and conventionally produced foods sold per supermarket

Average Variance for Food Products Sold

Table 1 compares the average sample variance against the means for each food product sold, to ascertain if the gap between the means is larger than the variance. The sample difference is an indication that organic food products are more expensive than conventional foods. The value $P(t \leq t)$ is in agreement with Ditlevsen, Sandøe, and Lassen, (2019) on the positive trends of the value of sales of organic foods.

Table 1: Differences in organic and conventionally produced food products sold by supermarkets (Asda+Sainsbury's+Tesco+Waitrose)

	Mean	Mean				
	Organic	Conventional	$P(t \leq t)$	Slope	Intercept	R^2
Fruits	3.52(41.81)	1.86(8.80)	0.016	2.002	0.193	0.844
Veg	3.05(9.50)	2.32(7.85)	0.000117	1.032	0.658	0.880
Meat	14.73(30.54)	10.34(26.60)	1.31703E-09	0.866	5.777	0.653
Processed Food	2.49(7.37)	1.78(4.57)	1.27417E-05	1.135	0.472	0.7981

Comparison of the Price of Organic foods versus Conventional Food Products sold in UK Supermarkets

Also, Table 2 compares the average sample variance of products sold in supermarkets in the UK against the mean to ascertain if the gap between the means is larger than the variance. The result shows that there is significant $P(t \leq 0.05)$ difference in the means of products (organic versus conventionally produced foods) sold by each supermarket. These are in agreement with Vigar, et.al (2019) that the excess prices

paid over or above a fair price is justified by the true product value and may be an indication of health considerations, awareness of food production systems, consideration for balanced nutrition and concerns for the environment and sustainability. .

Table 2: Comparison of cost of foods (organic versus conventionally produced foods) sold in supermarkets in UK

	Mean	Mean				
	Organic	Conventional	P(t<=t)	Slope	Intercept	R ²
ASDA	4.71(33.29)	3.43(20.30)	0.000038	1.235	0.480	0.929
SAINSBURY'S	5.45(41.66)	3.84(22.61)	0.000414	1.241	0.692	0.835
TESCO	5.24(39.01)	3.75(24.15)	0.00063	1.152	0.920	0.821
WAITROSE	6.50(58.44)	4.14(25.57)	6.03E-05	1.3962	0.722	0.853

Comparison of Price of Foods (Organic and Conventionally produced foods) sold in UK Supermarkets that are imported

In addition, a comparison of the total proportion of foods (both organic and conventionally produced foods) imported into the UK differ in price for Asda and Tesco supermarkets, but are of a similar rate at Sainsbury's and Waitrose (Table 3).

Table 3: Proportion of food sourced outside UK

Retailers	Origin	Organic	Conventional	Total
Asda	Not Uk	14	16	30
Sainsbury's	Not Uk	9	9	18
Tesco	Not Uk	10	9	19
Waitrose	Not Uk	9	9	18
Total		42	43	85
Expected Result		Organic	Conventional	Total
	Asda	14.82353	15.17647059	30
	Sainsbury's	8.894118	9.105882353	18
	Tesco	9.388235	9.611764706	19
	Waitrose	8.894118	9.105882353	18
	Total	42	43	85

Graphical Representation of Imported Food (Organic and Conventional foods) Products in UK Supermarkets

Also, the proportion of imported organically produced fruits is at a similar ratio to that of imported conventional fruits in the various supermarkets. But this ratio differs significantly between imported organic vegetables, meat, and processed foods and conventional vegetables, meat and processed foods sold in UK supermarkets. See Figure 2.

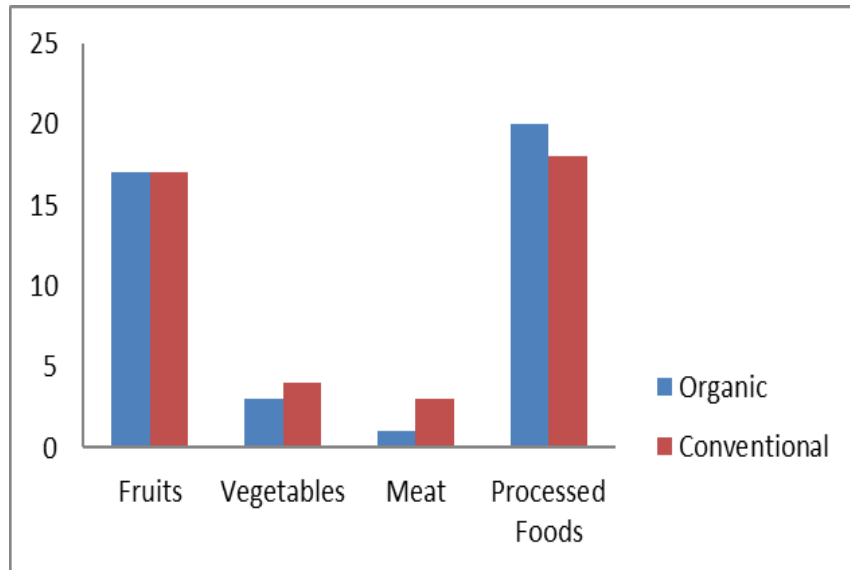


Figure 2: Total proportion of imported food (Asda+Sainsbury's+Tesco+Waitrose)

Lastly, in Figure 3 the estimated varieties of locally produced foods (organic or conventionally produced food) sold in different supermarkets in UK are of similar proportion in both Sainsbury's, Tesco and Waitrose. This is in agreement with IFOAM, (2019) on the increase in production and consumption of organic foods. However, conventional food products sold in Asda has a slight margin over its organic counterpart.

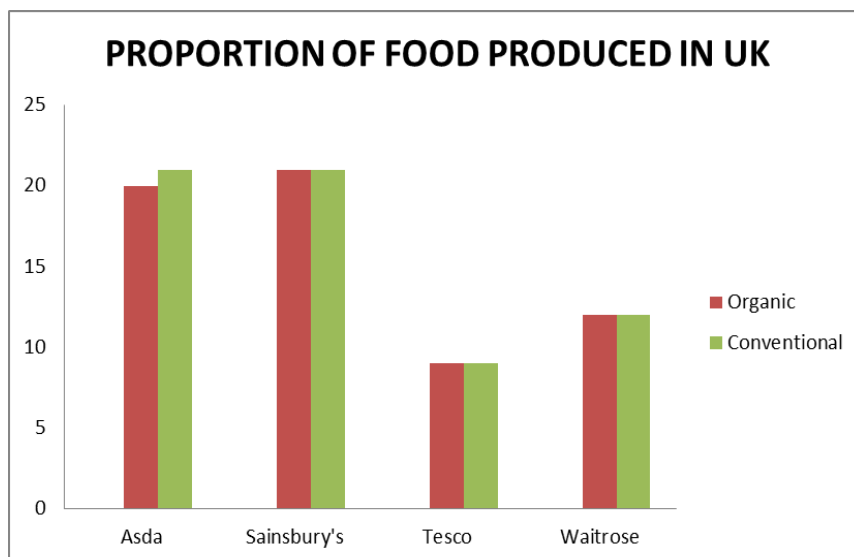


Figure 3: Estimated proportion of produced food sold in different supermarkets in UK

Conclusion and Recommendation

Organically produced foods are more expensive when compared to conventionally produced foods. This price difference is also evident in both sourced foods and locally grown foods, and in the different supermarkets. This could be a result of the high cost of producing organic foods, strict government production and organic certification standards, consumer perceptions, attitudes, health consciousness, awareness and willingness to pay for premium foods.

There should be an introduction of production policy by agricultural and food organizations to, encourage higher outputs but lesser input costs, guaranteed prices, surplus production and minimal environmental impacts. The design of agricultural farming systems should be sustainable, biodiversity-friendly, climate-smart and in consideration of the balance of the growing population's needs. Government should provide grants for farmers whose farming system supports biodiversity and encourage sustainable land use practices. Government funding should be directed towards subsidizing organic commodity production systems, to help support diversified production systems that are multifaceted and sustainable.

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