A cross-cultural comparison study of purchasing intentions, natural product packaging design and labeling information of naturally developed *Moringa oleifera* based beverages by Bangladeshi and German consumers

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Introduction

Background:

The *Moringa oleifera* (MO) originates from tropical and subtropical environments of the globe (Koul and Chase, 2015). It is widely cultivated in Asia, Africa, Latin America and other similar environments (Leone et al., 2015). It has been taken an attraction to the consumers as a natural nutritious vegetable compared to commonly available vegetables in those counties, e.g. Bangladesh, India and Nepal. Bangladeshi MO leaf contains a higher amount of nutrients compared to that of neighboring countries (Foidl et al., 2001). The dry MO leaves contain higher amounts of sodium, calcium and potassium compared to other vegetables (Rady et al., 2015). It is nutritionally potential vegetables because of its high amounts of nutrients, phenolic constituents and flavonoids, which represent an excellent sources of natural antioxidants (Valdez-Solana et al., 2015). MO leaf has been used for medical purposes because of its antibacterial (Ajayi and Fadeyi, 2015) and antidiabetic properties (Yassa and Tohamy, 2014).

This study aimed to analyze the possibility of MO leaf applications in food processing and consumer acceptance between two cultural groups (Bangladesh and Germany). Four natural non-alcoholic beverage prototypes were designed based on MO extract from the enrichment of natural sweetener (STEVIA), organically produced sweetening agent (SUGAR), natural sources of vitamin-C (ACEROLA) and natural citronella extract (ASCORBIC ACID). Although the Moringa-based beverages were highly accepted by consumers compared to Lipton tea in terms of product sensory attributes (Madukwe et al., 2013), there were significant differences in overall acceptance between cultural groups. On the other hand, over 70% of purchasing decisions were influenced by an attractive packaging (Ahmad et al., 2012). At the same time, labeling product information was also important to the consumers in order to choose or make a purchase decision (Azman and Sahak, 2014).

Objectives:

- The main goals of the research were to investigate development opportunities for a natural beverage based on *Moringa oleifera* leaf extract.
- To measure the purchasing intentions of consumers' between cultural groups before and after tasting prototypes
- To evaluate the impact of decision making process on labeling information of a natural beverage between two cultural groups.

Materials & Research Design

Development of prototypes:

The four prototypes of natural beverages were designed based on MO leaf extract along with other natural ingredients. Whereas, "STEVIA" based on the natural sweetening agent, "ACEROLA" based on natural sources of vitamin-C, "SUGAR" based on organically produced sugar and "ASCORBIC ACID" based on natural citrus aroma (citronella).

Consumer analysis:

A cross-cultural consumer study was conducted between cultural groups (Bangladesh and Germany) of consumers (n = 293) using center location test (CLT) method. The purchasing intentions of both cultural groups were measured in the same way: firstly, purchasing intention before tasting the prototypes; secondly, individual products purchasing or repurchasing intention after tasting the prototypes using the 5-point purchase intention scale (Rizwan et al., 2014). Consumer agreements on the labeling information about natural beverages were evaluated using 9-point agreement scale (whereas, 1 = extremely disagree and 9 = extremely agree).

Statistical analysis:

Consumer studies data was analyzed using XL-stat, Statistical Package for the Social Sciences (SPSS), Fizz Software (Biosystems). The significance (P<0.05) of the attributes was analyzed using Analysis of Variance (ANOVA) and pairwise Mann-Whitney test (Nachar, 2008) for all independent attributes.

Results & Discussion

Purchase Intention:

A cross-cultural studies between Bangladeshi and German consumers demonstrated different results for the purchasing intention of the concept product before tasting the prototypes. The highest number (42%) of German consumers expressing the opinion that they „might or might not buy" the product. The second largest group (39%) of German consumers preferred "would buy" (Figure 1). On the other hand, a significant number (68%) of Bangladeshi consumers revealed their preference for "would buy", while the second highest number (28%) within the Bangladeshi consumer group said they "might or might not buy" this kind of product.

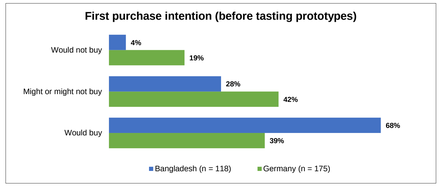

Figure 1: First purchase intention on the concept product before tasting prototypes (n = 293). (Purchase intention scale of 1 to 5 in which 1 = definitely would not buy and 5 = definitely would buy).

Purchasing intentions of four different prototypes (STEVIA, ACEROLA, SUGAR and ASCORBIC ACID) reflected different results for two cultural groups. A significant number of consumers (44%) scored ASCORBIC ACID as a most preferable prototype, sharing their decision that they "would buy" this product (Figure 2). The second highest scores of the same opinions were for the prototypes SUGAR (32%) and STEVIA (31%). Also, a similar number of consumers expressed their decision that they "might or might not buy" this kind of products. On the other hand, a significant number of consumers decided they "would not buy' STEVIA (44%) and ACEROLA (38%) products. In terms of pairwise comparison between prototypes, the ASCORBIC ACID prototype was significantly different (P<0.001).

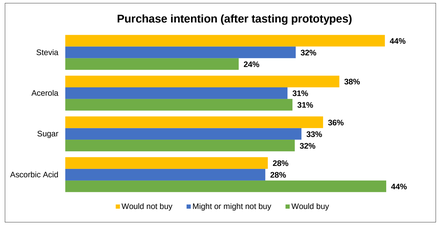

Figure 2: Purchase intention after tasting the prototypes (n = 293). (Purchase intention scale of 1 to 5 in which 1 = definitely would not buy and 5 = definitely would buy).

The results showed that the Top-2 box scores of the first purchase intention (before tasting the prototypes) was 39% for Germans and 68% for Bangladeshi consumers. After tasting the prototypes, the results also show that the ASCORBIC ACID prototype gained the highest scores from both Bangladeshi (56%) and German (37%) consumer groups (Figure 3). Apart from that, Top-2 box scores of the prototypes SUGAR, ACEROLA and STEVIA were also highly scored by Bangladeshi consumers 46%, 42% and 31% respectively than Germans.

Nevertheless, the results showing the matter of purchasing intentions were significantly different (P<0.001) before and after tasting the prototypes. The remaining consumers from both cultural groups noted they were not inclined to buy this product. Purchase intentions of four different products (STEVIA, ACEROLA, SUGAR and ASCORBIC ACID) reflected different results from two cultural groups.

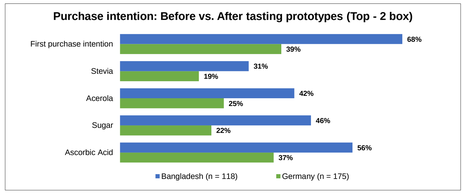

Figure 3: Comparison of purchase intention before and after tasting the prototypes (n = 293). (Purchase intention scale of 1 to 5 in which 1 = definitely would not buy and 5 = definitely would buy).

Some statements of the natural beverages' package design and label information were asked to both groups during consumer test. The results of the statement "**It is important to me to display actual products**" show that the agreement was significantly different (P<0.05) between the two cultural groups of Bangladeshi (92%) and German (88%) consumers (Figure 4). Among them, 34% of German and 37% of Bangladeshi consumers agreed highly with this statement. However, 9% of German and 5% of Bangladeshi consumers were in between "agreeing" and "disagreeing" with the above statement.

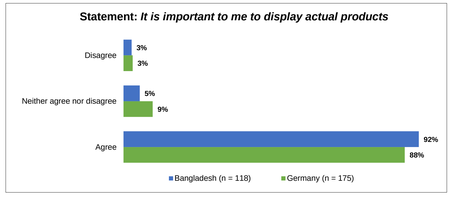

Figure 4: Assessors' agreements on display of actual products (n = 293). (Agreement scale of 1 to 9 in which 1 = extremely disagree and 9 = extremely agree).

The results show that agreement with the above statement was almost identical between two cultural groups of Bangladeshi (86%) and German (87%) consumers. Statistically there was no difference (P>0.05) between cultural groups. Among them, 28% of German and 29% of Bangladeshi consumers highly agreed with this statement (Figure 5). 6% of German and 8% of Bangladeshi consumers neither agreed nor disagreed on this statement. Nevertheless, In the case of disagreeing on the statement "**I would like to buy products with attractive packaging**" 7% of German and 5% of Bangladeshi consumers were different.

A big difference was reflecting the results of the statement by the Bangladeshi (92%) and German (63%) consumers (Figure 6). Among them, 35% of Bangladeshi and 22% of German consumers strongly agreed with this statement "**Labeling information is more important to me than an attractive packaging**". However, there were 19% of German and only 2% of Bangladeshi consumers that neither agreed nor disagreed with this statement.

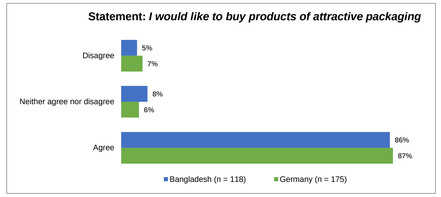

Figure 5: Assessors' agreements on packaging design (n = 293). (Agreement scale of 1 to 9 in which 1 = extremely disagree and 9 = extremely agree).

Furthermore, in the case of disagreeing with the above statement, German (18%) and Bangladeshi (7%) consumers had highly different opinions (Figure 6). Nevertheless, the differences between cultural groups were statistically significant (P<0.001).

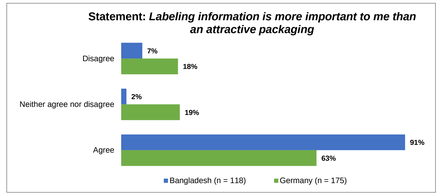

Figure 6: Assessors' agreements on labeling information and packaging (n = 293). (Agreement scale of 1 to 9 in which 1 = extremely disagree and 9 = extremely agree).

Different results have been observed among the purchasing intention from cross-cultural consumer studies and significant differences ($p < 0.001$) were found. The majority of Bangladeshi consumers (86%) revealed that they "would buy" this kind of natural beverages, while 61% of German consumers delivered the same opinion on the same concept products (Figure 7). Moreover, different results were also reflected on the purchasing intentions for individual prototypes ($p < 0.001$). All the prototypes were tested pairwise and results reflected that the ASCORBIC ACID prototype was rated significantly ($p < 0.001$) than the STEVIA and ACEROLA products. Apart from that, the STEVIA product was also significantly different ($p < 0.05$) from the SUGAR product.

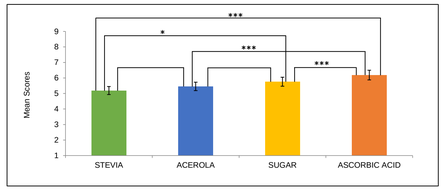

Figure 7: Pairwise comparison and significance in purchase intention of the prototypes (n = 293). (* Significant at 5%, ** Significant at 1%, *** Significant at 0.1% level).

Table 1: Purchasing intentions and the statements on packaging design

Explanations of attributes	Mean ± SD	n	Sig.
First Purchase Intention (before tasting prototypes)	3.28 ± 0.93	293	0.0001***
Repurchase Intention (after tasting prototypes)	3.18 ± 1.18	293	0.0001***
Likeliness of concept packaging	6.45 ± 1.63	293	0.0001***
It is important to me to display actual products	7.56 ± 1.33	293	0.002**
I would like to buy products of attractive packaging	7.25 ± 1.58	293	0.259 ns
Labeling information is more important to me than an attractive packaging	6.83 ± 1.92	293	0.0001***

* Significant at 5% level, ** Significant at 1% level, *** Significant at 0.1% level, ns = not significant.

Conlusions

Purchasing intentions of two different cultural groups and the products were pairwise significantly different. However, the first purchasing intention of the concept product was highly accepted by Bangladeshi consumers. Even after tasting the prototypes, the purchasing intention was also high among Bangladeshi consumers. Also, related to purchasing intention, the ASCORBIC ACID product was highly scored over other products by both group. The reason for this difference could be the innovation of natural beverage was a new idea of the Bangladeshi consumers and Germans were already aware of it. It has been shown that the awareness, cultural and the demographic characteristics of the consumers were affecting the decision making process of a product. Nevertheless, through highest purchasing intention scores, Bangladeshis are advanced for producing Moringa oleifera and its applications industrially.

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