Food and Nutrition Students' Evaluation for Home Meal Replacement Quality Using Importance-Performance Analysis

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Abstract

Purpose - This study attempts to identify the attributes of home meal replacements (HMR) from the perspective of consumers as well as suggest some directions for HMR.

Research Design, Data, and Methodology - For the research, food and nutrition professors were interviewed and surveys were completed using the revised Delphi method to identify attributes of HMR. Subsequently, a total of 140 food and nutrition students already aware of HMR were asked to rate the attributes in terms of importance and satisfaction. In addition, Importance-Performance Analysis (IPA) was conducted.

Results - According to the analysis results, a total of seven key factors were deduced from the attributes ratings and the Kaiser-Meyer-Olkin (KMO) criteria, which is used to verify the appropriateness of the selection of the variables.

Conclusion - The findings could be helpful in the future as reference data for HMR producers and distributors to assist in the diagnosis of the status of HMR. Additionally, the data may point to some areas that need greater attention in terms of production as well as marketing.

Keyword: Home Meal Replacement(HMR), HMR Quality, Evaluation for HMR, IPA, Food Science and Nutrition.

JEL Classifications: I30, M10, M11, M31, Q13.

1. Introduction

A range of factors including the 5-day workweek, the increase in dual income families, the growth of 1~2-person households,

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and the increasing camping culture have driven the explosive growth of local HMR(Home Meal Replacement) market. As the eToday(www.etoday.co.kr) reported, Nielsen Korea's 'Shopper Trend Report'(http://www.nielsen.com) highlighted the sales of frozen and chilled HMR products in large supermarkets grew 6% over 2013 as the only growth item in the stagnant grocery market. According to the industry, local HMR market recorded 1.3 trillion Won last year from 700 billion Won in 2010, and is expected to reach more than 1.5 trillion Won this year. Some are even more optimistic that the market size will exceed 2.3 trillion Won. This phenomenal growth is consistent with the '2015 Distribution Industry White Paper' recently published by the Korea Chamber of Commerce. According to the paper, convenience stores achieved 8.7% year-over-year sales growth in 2014, recording the highest growth rate among offline distribution channels.

<Figure 1> Annual Retail-specific Growth Rate

Notably, HMR was ranked second in 2014 in convenience stores, which is significant in that as a distribution channel representing short-distance hand-to-mouth buying, convenience stores should develop differentiated products meeting customers' consumption patterns to remain competitive (KCCI, 2015).

Despite the explosive growth of HMR market in line with social changes, research findings on HMR are scarce as of 2015. Yet, HMR market is projected to grow further, to compete with fresh products and to continue its growth pace for some time through segmentation and quality differentiation on account of ageing population comparable to advanced societies. Hence, HMR-related research is indispensable.

Ready-to-Heat food items that can be consumed after simple heating, and fresh convenient food items processed or containing additives or food ingredients that can be consumed as it is (Korea Food & Drug Administration, 2010). The industry classifies HMR as the ready-to-cook food items that are minimally prepared to be cooked and require some or all of ingredients to be cooked fully. This study incorporated all the concepts aforesaid into HMR.
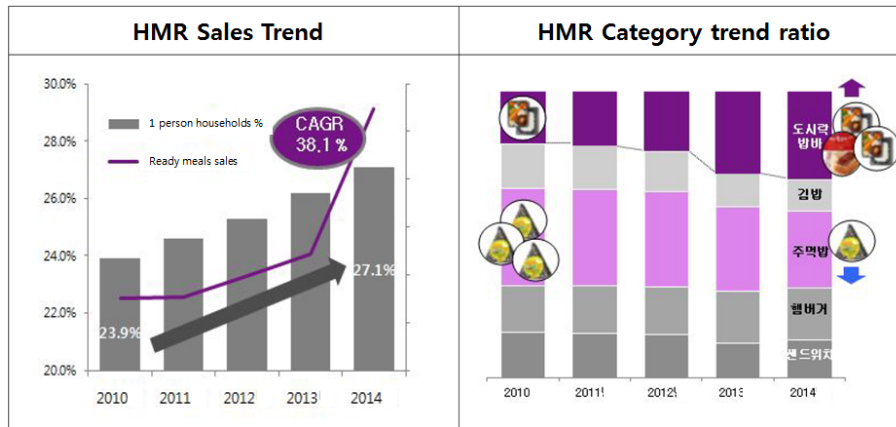
Note: quoted by 2015 Distribution and Industry White paper(KCCI, 2015)

<Figure 2> CVS's HMR Sales and Category trend ratio

Thus, this study attempted to elicit the attributes of HMR from the perspective of consumers and suggest some directions for HMR. To this end, food and nutrition professors were interviewed and surveyed using the revised Delphi method to elicit the attributes of HMR. Then, food and nutrition students aware of HMR were asked to rate the attributes in terms of importance and satisfaction. Moreover, IPA(Importance- Performance Analysis) was conducted to develop future strategies based on HMR attributes.

The present findings provide some cues for product development and marketing strategies for the benefit of business entities competing in HMR market, and give them an opportunity to apply the perspective of consumers to HMR.

2. Theoretical background

The term HMR has emerged quite lately. Therefore, HMR-related accurate statistical data and literature reviews in light of its market potential and growth are not sufficient (Lee, 2011). Grier(2001) defined HMR as the food items that are prepared commercially to be consumed at home or that save consumers the trouble of preparation entirely or partly. Korea Food & Drug Administration classifies HMR into Ready-to-Eat food items that can be consumed instantly without prior preparation,

Regarding product attributes, Levesque & McDougall(1996) asserted a theory of product attributes that consumers purchase not just a product but a mass of multiple attributes. Attributes as in the theory of product attributes are defined as properties or qualities meeting consumers' physical, social and psychological needs, and refer to proxy indicators against which consumers evaluate products (Levesque & McDougall, 1996). That is, as the characteristics of products that consumers take into account when they make decisions, product attributes constitute a comprehensive concept involving not only objective attributes but also subjective qualities consumers desire (Ahn & Park, 2003). In this context, consumers' evaluation of product attributes in purchasing products is highly important in that it reflects their purpose or motive for purchasing certain products (Lee, 2007). Differently put, as product attributes are associated with customers' attitudes towards the attributes of products in the course of selecting products, product attributes are critical to customers' decision-making on whether to purchase certain products or not(Dick & Basu, 1994). Thus, the proposed HMR-related selection attributes may be used as proxy indicators against which consumers select and evaluate products at the same time. In addition, from the perspective of businesses, such selection attributes are likely to provide an array of cues for HMR products fitted with competitive edges.

3. Methodology

3.1. Methods and Data Collection

The present study used an FGI with experts to elicit some attributes of HMR products. To be specific, the modified Delphi method was applied to food and nutrition professors. Originally, the Delphi method was developed as a collective discussion technique for inducing an agreement from group members using a planned anonymous repetitive surveys with a view to systematically eliciting responses from expert groups until an agreement is reached, while predicting, diagnosing and determining some issues. First, this study conducted an FGI(Focus Group Interview) with 3 experts based on the attributes suggested by previous studies on the attributes of ordinary products (e..g., Hall et al., 2001; Mitchell & Olsen, 1981; Moeey et al., 2002; Stanley, 1982) and asked them to rank the presented basic attributes of HMR in order of perceived importance. Then, these attributes were analyzed. Finally, 25 attributes were presented to food and nutrition students at J University to measure the importance and satisfaction.

According to Yang et al.(2014), IPA was first formulated by Martilla & James(1977), who wanted to grasp the importance of car dealer's service, to compare and analyze the relative importance and performance of 14 attributes; and has since been utilized in various service industry areas for choosing an area of concentration for competitiveness after analyzing customers' satisfaction factors and dissatisfaction factors, or for providing support for resource allocation in the implementation of strategies(Deng, 2007). Originally, IPA is a technique for measuring users' satisfaction; it measures the importance of each attribute before use and evaluates satisfaction after use, and compares and evaluates the relative importance and satisfaction of each attribute at the same time. Its basic assumption is to judge customers' levels regarding satisfaction attributes (Hammitt et al., 1996; Yang et al., 2014 re-quotation). Here, the level of importance is measured on the basis of importance relative to various quality dimensions, and a quality dimension of high importance is judged to have great effects on end users' positive perceptions(Yang et al., 2014).

The importance of and satisfaction with each factor was rated on a 5-point Likert scale (1 for 'highly important' and 'highly satisfied', and 5 for 'Not important at all' and "Not satisfied at all'). The items were reverse coded prior to the analysis.

Total of 140 participants of surveys were collected to department of Food Science and Nutrition Students in J university. Gender distribution of participants were more female students 108(77.1%) than male student 32(22.9%), and the average age of participants was 19.8 years.

3.2. Reliability and Validity of Measurement Scale

For the purpose of HMR properties are grouped, the principal component analysis was used, and the varimax rotation method was used for the independent interpretation between factors.

According to the analysis result, a total of 7 factors were deduced and the Kaiser- Meyer-Olkin(KMO) criteria which is to verify the appropriateness of the selection of variables was 0.819, a relatively good value. Also, the Bartlett's Test of Sphericity which presents whether the model of factor analysis is appropriate to verify the null hypothesis of 'the correlation matrix was unit matrix' and the verified value of the analysis result is 1,656.357 and the significant probability of this value is 0.000 and thus the null hypothesis is overruled. Thus, it can be concluded that the use of factor analysis is appropriate and the common factor exist.

<Table 1> Results of HRM Factor Analysis

No	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7
i18	.769	.120	.047	.130	-.069	.169	-.094
i19	.763	.235	.031	.002	.174	.033	-.006
i15	.748	.208	-.029	.100	.073	.072	.178
i17	.712	.158	.193	.175	.144	.159	.077
i13	.607	.162	.243	.071	.322	-.056	.349
i1	.517	.008	.458	.072	-.345	-.132	.330
i16	.494	.155	.484	.273	.121	-.060	.138
i22	.170	.752	-.017	.239	-.057	-.003	.093
i21	.005	.656	.145	.033	.270	.207	.231
i23	.262	.653	-.104	-.031	.026	.235	.035
i24	.476	.610	-.027	.122	-.002	.080	.164
i14	.154	.530	.223	-.013	-.039	.359	.013
i25	.126	.520	.481	-.027	.286	-.033	-.064
i2	-.050	-.026	.805	.062	.205	.170	.046
i4	.167	.209	.502	.250	.127	-.335	.337
i3	.455	-.116	.488	.192	-.153	.094	.266
i11	.408	.180	.473	.436	.086	-.112	-.140
i9	.157	.068	.099	.903	.009	-.007	.127
i10	.155	.089	.127	.893	.156	-.024	.042
i12	.183	.041	.099	.126	.828	.173	-.019
i7	.083	.086	.154	.064	.776	.000	.295
i20	.133	.265	.083	-.102	.046	.837	.070
i8	.117	.178	-.049	.052	.149	.828	.067
i5	-.022	.364	.098	.033	.193	.140	.685
i6	.493	.030	.080	.149	.102	.067	.666

To see if the attributes relevant to the importance of HMR varied with factors, the principal component analysis (PCA) was performed. The results of PCA are as below.

The PCA results were compared with attributes. Factor 1 had such sub-factors as product quality(i1, i13, i16), environment-friendliness(i15, i18) and manufacturing and processing(i17, i19). Factor 2 had sub-factors such as packaging and storage(i14, i22) and sales and distribution(i23, i24). Factor3 was named product safety(i3, i4, i11). Factor 5 involved expiry dates(i9, i10) and volume and price(i7, i12). Factor 6 was named brand awareness(i8, i20). Factor 7, however, had recipes(i5) and place of origin(i6), both of which hardly showed commonality and were eliminated. Likewise, texture(i25) and cooking hours(i21) in Factor 2 as well as savor (i2) in Factor 3 lacked in commonality and were excluded.
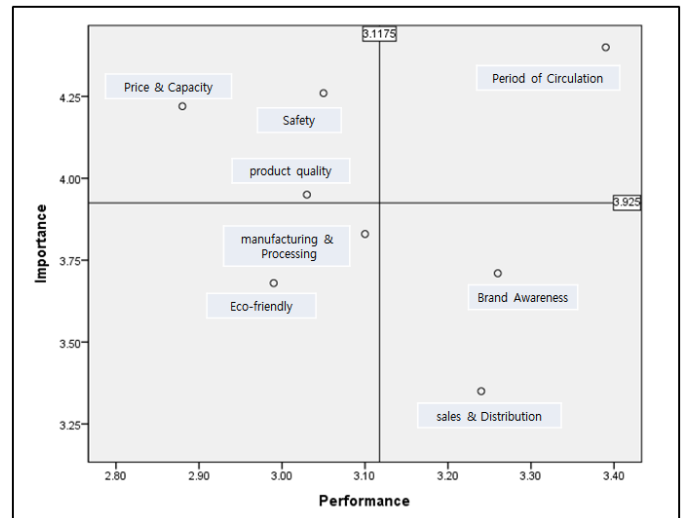
To find out if measurement items are internally consistent, reliability was verified using Cronbach α. Nunnally(1978) argued that if Cronbach α is over 0.7, it is considered reliable. In this respect, the reliability of variables in this study was found to be 0.871~0.913. As a result of confirmatory factor analysis to verify validity of variables, all variables' AVE are over than 0.5 to confirm validity except packaging and keeping. The results in <Table 2> indicate some prospective causal relations between product attributes and satisfaction or purchase intention.

<Table 2> Reliability and Validity

Variables	item	Cronbach's α	Construct reliability	AVE
Product Quality	3	0.718	0.764	0.522
Eco-friendly	2	0.761	0.787	0.648
Manufacturing & Processing	2	0.772	0.799	0.666
Packaging & Keeping	2	0.455	0.483	0.319
Sales & Distribution	2	0.762	0.778	0.643
Safety	3	0.646	0.758	0.513
Period of Circulation	2	0.872	0.918	0.848
Price & Capacity	2	0.733	0.834	0.721
Brand Awareness	3	0.798	0.797	0.667

4. Empirical Analysis

As a result of carrying out the paired sample t-test to analyze differences in importance and performance evaluation, it was found that t-value. it was found that there was differences between importance and performance evaluation for each variable except sales and distribution. TGhe results of the paired sample t-test were represented in <Table 3>

<Table 3> Results of Paired Sample t-test (n=140)

Variables	Compare between sub items	Mean[1] difference	S.D	t-value	p-value
Product Quality	Importance	.926	.884	12.393	.000
	Performance				
Eco-friendly	Importance	.686	.920	8.818	.000
	Performance				
Manufacturing & Processing	Importance	.736	.918	9.479	.000
	Performance				
Sales & Distribution	Importance	.104	.939	1.304	.194
	Performance				
Safety	Importance	1.213	.814	17.634	.000
	Performance				
Period of Circulation	Importance	1.014	.901	13.312	.000
	Performance				
Price & Capacity	Importance	1.336	1.06	14.956	.000
	Performance				
Brand Awareness	Importance	.457	.817	6	.000
	Performance				

<Figure 3> IPA Results for Factors

The interpretation of IPA results may be approached in terms of two viewpoints. First, they may be interpreted according to the criteria of quadrant approach arranged by Yang et al.(2014), as follows:

First, Quadrant I is an area of high importance and high performance, and contains elements highly regarded by students. Therefore, it is desirable to maintain the elements continuously

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1) Mean difference: Importance - performance

such as period of circulation, and the elements may be actively utilized as elements of differential advantage for the success of HMR company. Quadrant II is an area of high importance and low performance. Its attributes are highly regarded by students, but show low performance, and thus require immediate attention for improvement such as price and capacity, safety and product quality. Therefore, they are elements that require immediate investment with top priority. Quadrant III is an area of low importance and low performance. Students show low importance and performance, both of which are below average, to its evaluation attributes; which indicates that current efforts are unnecessary. Thus, it is judged that there is a low necessity to invest additional resources into the attributes such as manufacturing and eco-friendly. Lastly, Quadrant IV is an area of low importance and high performance. It denotes attributes that are not highly regarded by students, but show excessive performance. Actually they are not very important attributes. Therefore, it is judged that efforts put in the attributes may be reduced or be stopped according to circumstances, and it is desirable to divert efforts to other area. The second perspective is presented in the conclusion.

5. Discussions and Summary

The present study noticed a paucity of research on HMR in contrast with the explosive growth of the market. To find out how consumers find the attributes of HMR, an FGI with experts and the modified Delphi technique were used to elicit the attributes. Then, students majoring in food and nutrition were asked to rate the importance of and satisfaction with the elicited HMR attributes. Next, to investigate consumers' perception of currently available HMR products, and to provide production and marketing cues for HMR suppliers and sellers, the IPA was performed.

The findings have the following implications.

First, the attributes of HMR extracted from the FGI with experts and the modified Delphi method were found to reflect the attributes of currently available HMR products to some extent. Notably, the present findings are conducive to research efforts in this field, in that it verified the reliability and validity of such attributes, which could be used for analyzing some causal relations between antecedents and dependent variables associated with the importance and satisfaction.

Second, IPA results showed the status of HMR attributes perceived by food and nutrition students. As seen in <Figure 3>, students were less satisfied with current HMR products in view of price, volume, safety and quality, which they considered important factors. Both the importance of and the satisfaction with manufacturing/processing and environment-friendliness were low. This finding indicates that students did not consider manufacturing/processing and environment-friendliness in their selection of HMR products. Students' perception of the importance of brand awareness or sales and distribution was lower than the satisfaction with those factors. This finding need be investigated further with adolescents of an age group apart from the food and nutrition students because the latter subjects are likely to be interested in HMR more than other students in general, and thus their responses cannot represent general consumers.

Third, the findings can be used as reference data by HMR producers and distributors to diagnose the status of HMR as they may hint at some fields that need paying more attention in relation to production and marketing. The IPA demonstrated that the 2nd quadrant needed improving most urgently, suggesting diversified strategies should be developed in terms of relevant factors such as price, volume, safety and quality.

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