# Competitive Factor Analysis of Global Readymade Garment Business In Bangladesh

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## Abstract

*At present Readymade Garment (RMG) is the leading industry and one of the leading exporters in Bangladesh. It needs limited financial investment and relative simple technology compared to other high-tech industries. In this study, the author has identified the competitive factors in the global market of RMG business. For finding the most influential competitive factors, the author has collected primary data and used semi-structured questionnaire for the purpose of interview to the respondents. 120 respondents have been selected with probably proportion to size (PPS) for interview. Factor analysis technique has been used in this study. The complexity of inter-correlations among the responses led to the use analysis techniques to probe the relation ship among the responses. Principal factor analysis seeks to explain the inter-correlations between variables with as small number of common factors as possible and extracts the maximum amount of variance due to each factor at each stage. Statistical Packages for Social Science (SPSS) package has been used for the data analysis of the study. The findings of this study indicated that price; quality and lead-time are the very influential factors in the global RMG business*

## 1. Introduction

At present, the export oriented Readymade Garment (RMG) industry with an export of more than US$6 billion and providing direct employment to about 2 million people as well as contributing about 76% in the country's total export earnings is considered to be one of the most important sectors of Bangladesh. In fact, the export business of Bangladesh mainly depends on this sector and the economic security of Bangladesh also will depend on how this industry performs in future. But in near future, some issues will create certainly threat for Bangladesh RMG exporters. The increase in number of competitors and slow market growth indicates that there would be a fierce competition in the global RMG exports market. It is however clear that the competition will be much stronger. Bangladesh RMG industry is already experiencing the effect of competition. Only 17% of the factories are doing somehow well at present, out of 3000 factories, 1000 are facing closure, most are struggling desperately to survive, and only 500 are thriving (Lee, 2001). RMG industry will depend on the development of sustainable international competitiveness and efficiency in handling the emerging challenges and opportunities. It is clear that the competition will be much stronger. This competition will be from both the old and new competitors (suppliers of apparels in the world markets) and in the areas of price, quality, lead-time, product categories and product designs and so on (Siddiqi, 2000).

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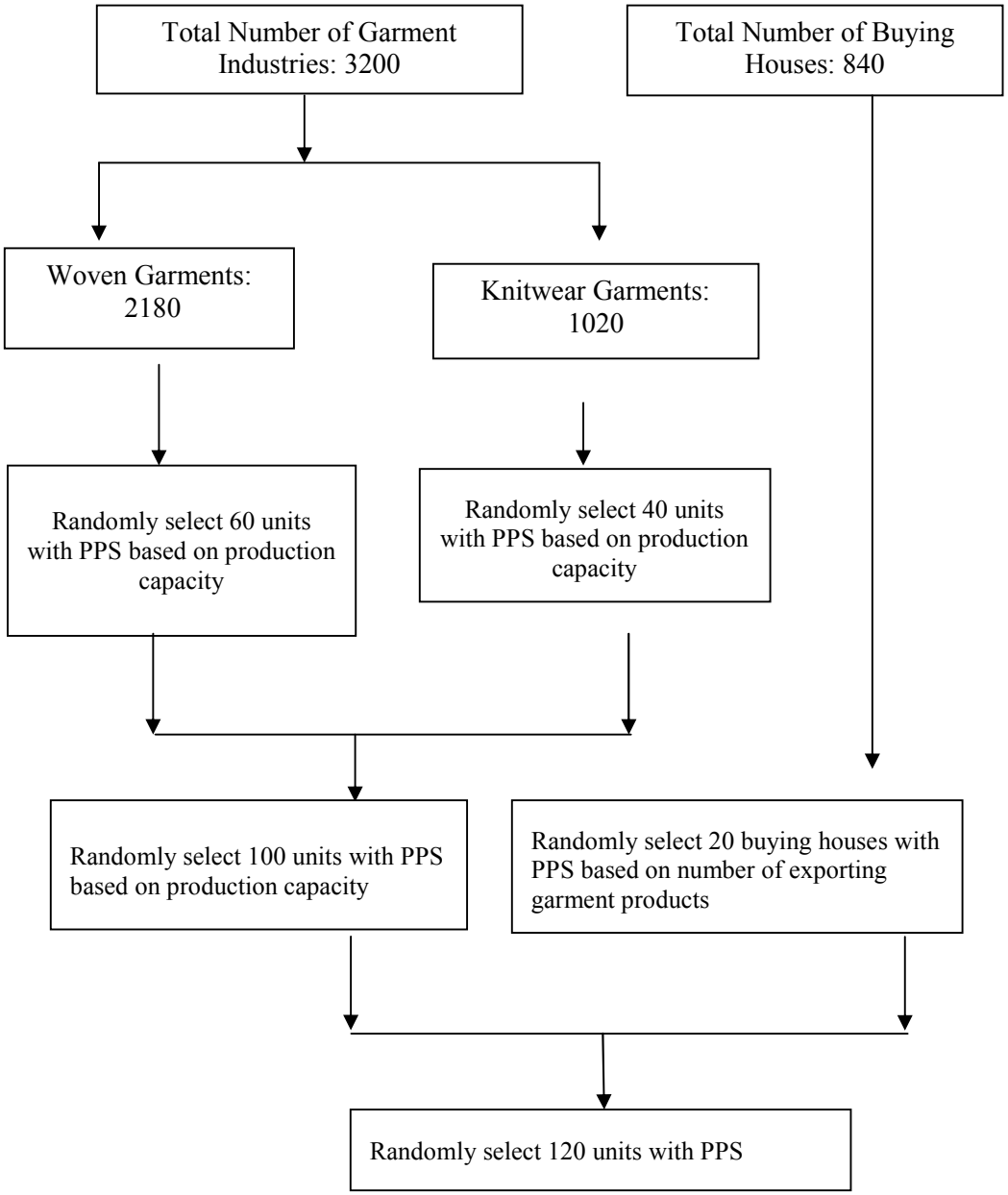
Cavusgil and Nevin (1981) suggested that a major predictor of the export behavior of a firm is the strength of the commitment of managers to export rather than any factor external to the firm. The relevance of export barriers, however, continues to condition the efforts of researchers in synthesizing a composite model of the export process (Muller, 1984). Bhattacharjee et al. (1993) reported that the key factors affecting the export decision of garment products are the national export policy, comparative marketing distance, and lack of export commitment, exogenous economic constraints and competitive rivalry. Conceptual and modeling studies have evaluated the relationship between export and barriers that exists in the environment firms on the issue of export barriers. In this context, the following studies were found in the literature (Goodnow, 1972; Simpson, 1974; Bilkey, 1978; Rabino, 1980; Cavusgil and Navin, 1981; Glover, 1983; Czinkota, 1983; Dichtl et al., 1984; Kaynak and Kothari, 1984; Ried, 1981 and Bauerschmidt, 1985).

Readymade Garment (RMG) industry has become the largest source of employment generation. Approximately 2 million people are presently involved in the RMG industry of Bangladesh and the sector through linkage effects is currently generating about US$ 2 billion worth of domestic economic activities (Bhattacharya and Rahman, 2001). In such a situation, closure of any unit in the RMG industry will make a number of workers jobless. With the current performance of agriculture and other industrial sectors, it would not be possible to create enough job opportunities for these workers. Undoubtedly, this situation will create a lot of socioeconomic problems. In the face of major changes in the clothing business and competition in the global market, the current performance of Bangladesh RMG industry is under threat. In that case, any study like this, focusing on creating competitive advantage and keeping the sustainable growth of Bangladesh RMG industry has immense importance in the socio-economic development of Bangladesh. This study makes attempt to identify the competitive factors of global RMG business which factors are playing the vital role in international market.

## 2. Methodology

This study is based on primary data. Key executives of the garment units and buying houses, Bangladesh Garment Manufacturers and Exporters Association. (BGMEA) and industry expert have been interviewed for collecting primary data. Focus Group discussions (FGD) have been conducted with the owners and officials of RMG units and executives of buying houses. A semi-structured questionnaire has been used for the purpose of interview to the respondents. Semi-structured questionnaire has been chosen to broaden the scope of the information gathered, to check for bias and misunderstanding in the responses and to obtain valuable qualitative judgments. Data for the variables have been collected from the respondents through 5 point Likert scale.

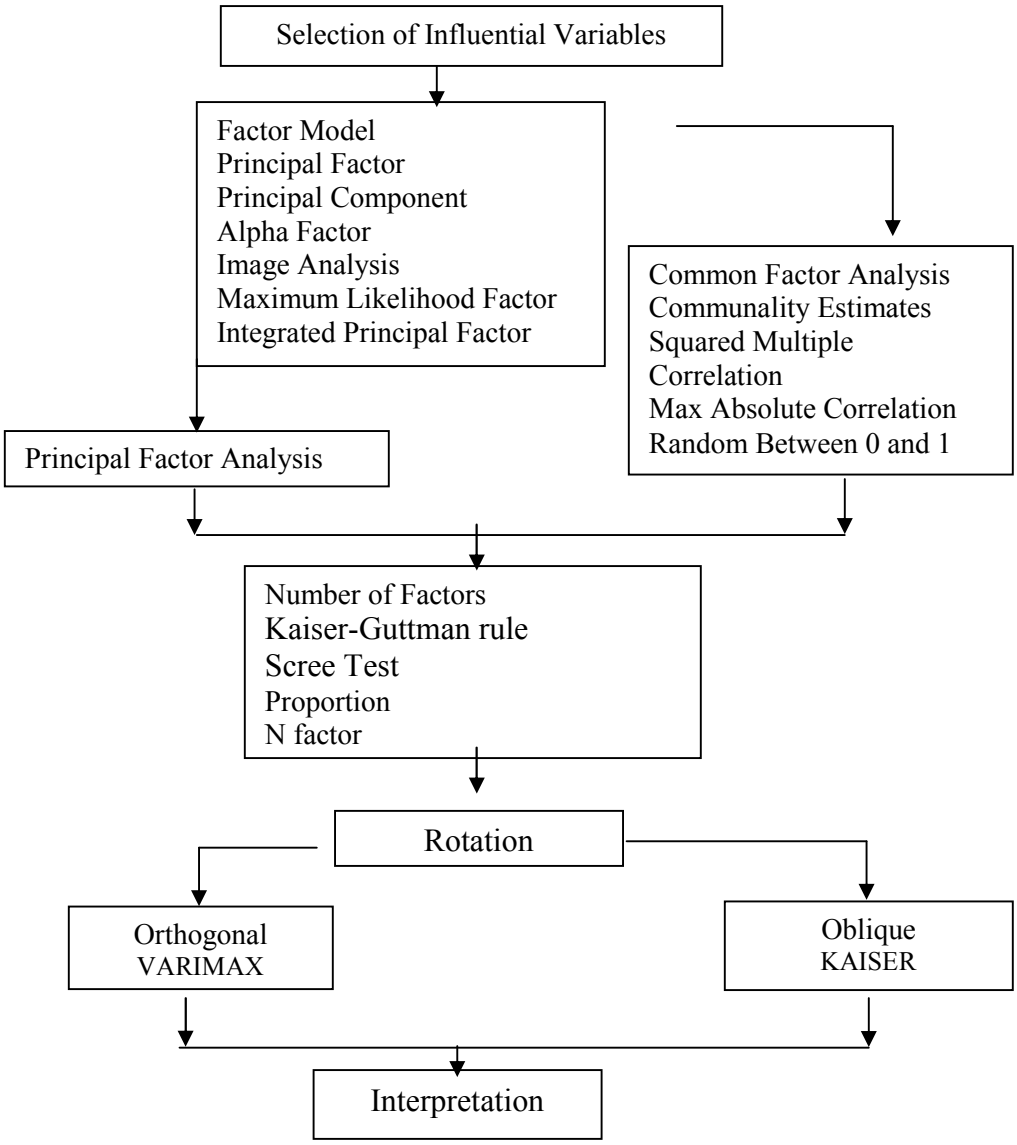
Fig.-1 : Sampling Selection Diagram




For the purpose of collecting primary data, 100 RMG units have been selected from the garment directory published by the Bangladesh Garment Manufacturers and Exporters Association. Out of 3200 firms as listed in the garment directory, where 2180 firms are

exporting woven garments and 1020 firms are exporting knitwear garments, from the total number of woven industries, 60 industries have been selected as well as from the 1020 knitwear industries, 40 industries have been selected using Probability Proportion to Size (PPS) based on existing production capacity. A total number of 20 buying houses have been selected randomly from 840 buying houses taking from the Bangladesh Garment and Textile Directory. Sampling selection diagram for this study shown in figure 1.

Fig.-2: Factor Analysis Decision Diagram



The complexity of inter-correlations among the responses led to the use of factor analysis techniques to probe the relationship among the responses. Principal factor analysis seeks to explain the inter-correlations between variables with as small number of common factors as possible and extracts the maximum amount of variance due to each factor at each stage. A detail flowchart of the multivariate statistics: a factor analysis technique is presented in figure 2. Statistical Packages for Social Sciences (SPSS) package has been used for the data analysis of this study.

Factor Analysis Model:

$$\underset{(p \times 1)}{(x_i|\mu,\Lambda,f_i,m)} = \underset{(p \times 1)}{\mu} + \underset{(p \times m)}{\Lambda} \underset{(m \times 1)}{f_i} + \underset{(p \times 1)}{\varepsilon_i},$$

$$p(x_i|\mu,\Lambda,f,\Psi,m) = (2\pi)^{-p/2} |\Psi|^{-1/2} \exp[-\tfrac{1}{2}(x_i - \mu - \Lambda f_i)'\Psi^{-1} (x_i - \mu - \Lambda f_i)] .$$

Variables are: (1) price (2) quality (3) design & fashion (4) lead time (5) brand & country image (6) friendly & hygienic product and (7) product differentiation & varieties. Qualitative judgments of 5 point Likert scales are: (1) not at all important, (2) not very important, (3) somewhat important, (4) very important, and (5) extremely important

**The parameters ($\mu,\Lambda,f,\Psi$) in the model are unknown and thus require estimation.**

Factor analysis is applied as a data reduction or structure detection method (Lawley and Maxwell, 1971). A scree test consists of plotting the normalized eigenvalues of the observed covariance matrix. Selecting the number of factors by percent variation consists of selecting a cumulative percent variation value and selecting the number of factors to be the minimum number of eigenvalues that account for at least that amount of total variation in the observed covariance matrix. Lee and Press (1998) showed that for the model proposed in Press and Shigemasu (1989; 1997) (which is the same model used in Rowe and Press 1998), it is robust with respect to the parameters but is most sensitive to the assessment of the prior mean for the factor loadings. This was done using a model (Berger & Berlinger, 1986). The descriptive statistics of the seven important competitive factors in the international market of readymade garment business are showed in Table-1. Once the input data are prepared for the analysis, it is necessary to decide on a factoring technique, that is, a method of extracting factors.

## 3. Results and Discussions

The multivariate statistical model known as Factor Analysis can determine the relationship among a set of variables. The statistical approach involving finding a way of condensing the information contained in a number of original variables into a smaller set of dimensions (factors) with a minimum loss of information. Many statistical methods are used to study the relation between independent and dependent variables. Factor analysis is different; it is used to study the patterns of relationship among many dependent variables, with the goal of discovering something about the nature of the independent variables that affect them, even though those independent variables were not measured directly (Lawley, 1940; Rubin and Thayer, 1982; Hayashi, 1997; Lee, 1994; and Lee and Press 1998; Hutcheson and Sofroniou, 1999).

**Table-1: Descriptive Statistics of the Important Competitive Factors in the International Market of RMG Business.**

| Competitive Factors | Mean | Standard Deviation | Analysis N |
|---|---|---|---|
| Price | 4.91 | .29 | 120 |
| Quality | 4.88 | .35 | 120 |
| Design & Fashion | 1.68 | 1.98 | 120 |
| Lead-Time | 4.83 | .42 | 120 |
| Brand & Country Image | 1.67 | .65 | 120 |
| Friendly & Hygienic Product | 1.66 | .67 | 120 |
| Product Differentiation & Varieties | 1.59 | .60 | 120 |

Factor analysis has been widely used to examine the structure of tests or scales of various kinds, such as personality scales, attitude measures, and ability scales. The matrix of has been intercorrelations among the variables showed in Table-2. Factor analysis is designed to explain why certain variables are correlated. Moreover, common factor analysis is concerned only with that portion of total variance shared by the variables included in the model (Table-2).

Table-2: Matrix of the Intercorrelations among the Important Competitive Factors in the International Market of RMG Business.

**Correlation Matrix** [a]

| | | PRICE | QITY | DF | LEADT | BCI | FHP | PDV |
|---|---|---|---|---|---|---|---|---|
| Correlation | PRICE | 1.000 | .394 | -.022 | .416 | -.119 | -.033 | -.072 |
| | QITY | .394 | 1.000 | .056 | .260 | -.099 | -.028 | -.109 |
| | DF | -.022 | .056 | 1.000 | .064 | .100 | .083 | -.109 |
| | LEADT | .416 | .260 | .064 | 1.000 | .030 | -.035 | -.052 |
| | BCI | -.119 | -.099 | .100 | .030 | 1.000 | -.071 | .100 |
| | FHP | -.033 | -.028 | .083 | -.035 | -.071 | 1.000 | -.204 |
| | PDV | -.072 | -.109 | -.109 | -.052 | .100 | -.204 | 1.000 |
| Sig. (1-tailed) | PRICE | | .000 | .407 | .000 | .099 | .360 | .217 |
| | QITY | .000 | | .273 | .002 | .141 | .379 | .117 |
| | DF | .407 | .273 | | .245 | .140 | .185 | .117 |
| | LEADT | .000 | .002 | .245 | | .371 | .352 | .286 |
| | BCI | .099 | .141 | .140 | .371 | | .221 | .139 |
| | FHP | .360 | .379 | .185 | .352 | .221 | | .013 |
| | PDV | .217 | .117 | .117 | .286 | .139 | .013 | |

a. Determinant = .602

[Price, QITY= Quality, DF= Design & Fashion, LEADT= Lead-Time, BCI= Brand & Country Image, FHP = Friendly & Hygienic Product, PDV= Product Differentiation & Verities]

Kaiser and Rice (1974) proposed a measure of sampling adequacy, which indicates how near $R^{-1}$ is to a diagonal matrix (Table 3).

Table-3: KMO and Bartlett's Test of the Important Competitive Factors in the International Market of RMG Business.

KMO and Bartlett's Test

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .596 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 58.865 |
| | df | 21 |
| | Sig. | .000 |

Extracting more factors will guarantee that the residual correlations get smaller and thus that the chi-square values get smaller relative to the number of degrees of freedom. However, non-interpretable factors may have little utility. That is, an interpretable three-factor (price, quality and lead-time) solution may be more useful than a less interpretable four-factor (design and fashion, brand and country image, friendly and hygienic product,

product diversity and verities) solution with a better goodness-of-fit statistic. The "eigenvalues greater than one" rule has been most commonly used due to its simple nature and availability in various computer packages. It states that the number of factors to be extracted should be equal to the number of factors having an eigenvalue (variance) greater than 1.0. It has been suggested that the latent root (eigenvalue) criterion should be lower and around the average of the initial communality estimates. Another criterion, related to the latent root criterion, is the percentage or proportion of the common variance (defined by the sum of communality estimates) that is explained by successive factors (Table-4&5).

Table-4: Communalities Analysis of the Important Competitive Factors in the International Market of RMG Business.

Communalities

| | Initial | Extraction |
|---|---|---|
| PRICE | 1.000 | .672 |
| QITY | 1.000 | .518 |
| DF | 1.000 | .633 |
| LEADT | 1.000 | .577 |
| BCI | 1.000 | .672 |
| FHP | 1.000 | .541 |
| PDV | 1.000 | .551 |

Extraction Method: Principal Component Analysis.

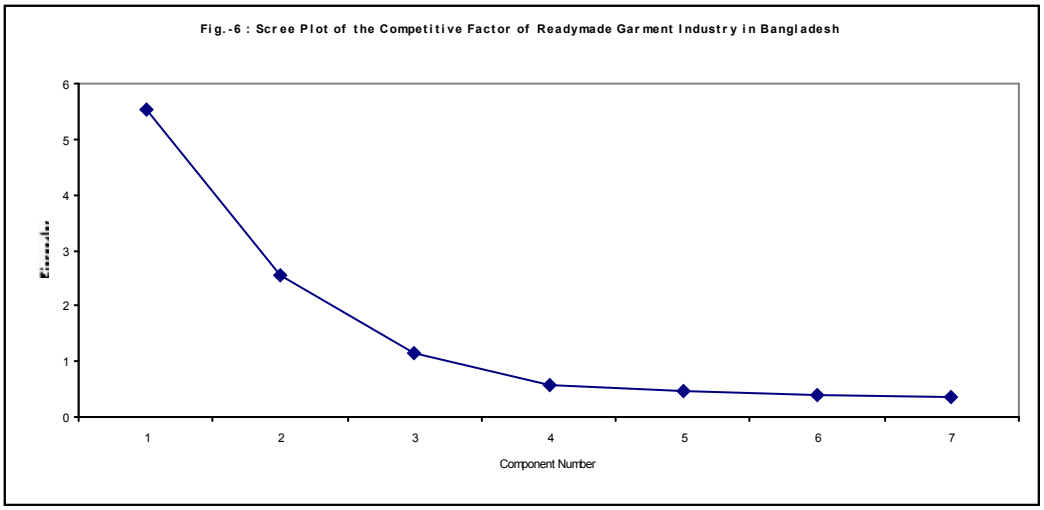
[Price, QITY= Quality, DF= Design & Fashion, LEADT= Lead-Time, BCI= Brand & Country Image, FHP= Friendly & Hygienic Product, PDV= Product Differentiation & Verities]

Table-5 showed the factor numbers and corresponding eigenvalues. According to the Kaiser and Guttman rule, only one factor can be retained because only the first factor has an eigenvalue greater than one. However, as suggested in the previous section, this criterion may be applicable only to principal component analysis, not common factor analysis.

First, the result retain only three factors (price, quality and lead-time) with eigenvalues greater than 1. This criterion is probably the one most widely used. A graphical method is the *scree* test used in this study. The plot the eigenvalues shown above in a simple line plot (Figure-3). The results suggested to find the place where the smooth decrease of eigenvalues appears to level off to the right of the plot. To the right of this point, presumably, one finds only "factorial scree" ("scree" is the geological term referring to

the debris which collects on the lower part of a rocky slope). According to this criterion, the results retain 3 factors (price, quality and lead-time) in this study.

Sometimes plotting the eigenvalues against the corresponding factor numbers gives insight into the maximum number of factors to extract. The scree plot figure-3 showed the rate of change in the magnitude of the eigenvalues for the factors. The rate of decline tends to be fast for the first few factors but then levels off. The "elbow", or the point at which the curve bends, is considered to indicate the maximum number of factors to extract. Figure-3 below showed that a rather idealistic scree plot, where a clear elbow occurred at the third factor, which has an eigenvalue right around 1. The result showed that the eigenvalues for the first few variables drop rapidly and after the third factor the decline in the eigenvalues gradually levels off. The scree plot suggested a maximum of three factors (price, quality and lead-time) consider in this study. However, many scree plots do not give such a clear indication of the number of factors. The scree plot shows the presence of a general factor as predicted from the inspection of the correlation matrix. A large first eigenvalue (5.55) and a much smaller second eigenvalue (2.54) and third eigenvalue




(1.15) suggested the presence of a dominant global factor. Stretching it to the limit, one might argue that a secondary elbow occurred at the third factor. That is equivalent to retaining all factors with positive eigenvalues.

Since the first three factors (price, quality and lead-time) were the only ones that had eigenvalues > 1, the final factor solution will only represent 83.53% of the variance in the data. The loadings listed under the "factor" headings represent a correlation between that item and the overall factor.

Table-5: Total Variance Explained by the Important Competitive Factors in the International Market of RMG Business.

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variances | Cumulative % | Total | % of Variances | Cumulative % | Total | % of Variances | Cumulative % |
| 1 | 5.55 | 50.18 | 50.18 | 5.55 | 50.18 | 50.18 | 5.52 | 49.91 | 49.91 |
| 2 | 2.54 | 22.95 | 73.13 | 2.54 | 22.95 | 73.13 | 2.55 | 23.04 | 72.95 |
| 3 | 1.15 | 10.40 | 83.53 | 1.15 | 10.40 | 83.53 | 1.17 | 10.58 | 83.53 |
| 4 | 0.56 | 5.07 | 88.60 | | | | | | |
| 5 | 0.48 | 4.34 | 92.94 | | | | | | |
| 6 | 0.41 | 3.71 | 96.65 | | | | | | |
| 7 | 0.37 | 3.35 | 100.00 | | | | | | |

In the second column (*Eigenvalue*) above, we find the variance on the new factors that were successively extracted. In the third column, these values are expressed as a percent of the total variance. The results showed that factor 1 accounts for 50.18 percent of the variance, factor 2 for 22.95 percent, factor 3 for 10.40 percent and so on. As expected, the sum of the eigenvalues is equal to the number of variables. The third column contains the cumulative variance extracted. The variances extracted by the factors are called the *eigenvalues*. This name derives from the computational issues involved (Table-5).

Most computer packages use varimax rotation, although there are other techniques. Table-6 showed what the factors might look like if we rotated them. Notice that the loadings are distributed among the three factors, and that the results are easier to interpret.

A number of orthogonal and oblique rotation procedures have been proposed. The VARIMAX method has been the most commonly used orthogonal rotation procedure.

Table-6: Varimax with Kaiser Normalization Rotation Converged in 4 Iterations of the Important Competitive Factors in the International Market of RMG Business**.**

**Rotated Component Matrix**

| | Component | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| PRICE | .808 | -8.39E-.3 | -.137 |
| QIY | .710 | 9.424E-.2 | -6.93E-02 |
| DF | 8.227E-02 | .356 | .707 |
| LEADT | .733 | -6.11E-.2 | .192 |
| BCI | -.108 | -.307 | .752 |
| FHP | -.125 | .725 | -4.13E-03 |
| PDV | -.139 | -.729 | 1.228E-.3 |

Extraction Method : Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iteration

[Price, QITY= Quality, DF= Design & Fashion, LEADT= Lead-Time, BCI= Brand & Country Image, FHP= Friendly & Hygienic Product, PDV= Product Differentiation & Verities]

The goal of all of these strategies is to obtain a clear pattern of loadings, that is, factors that are somehow clearly marked by high loadings for some variables and low loadings for others. Now the pattern is much clearer. As expected, the first factor is marked by high loadings on the Prices, Quality and Lead-Time items, the second factor is marked by high loadings on the Friendly and Hygienic Product (FHP) and Product Diversity and Verities (PDV) items the third factors are Design and Fashion (DF), Brand and Country Image (BCI) items. The study finding thus conclude that satisfaction, as measured by our questionnaire, is composed of those three aspects; hence we have arrived at a *classification* of the variables (Table-6&7). The Table-6 and 7 showed that the factor structure matrix after the VARIMAX rotation. There are some split loadings where a variable is significantly (correlations > 0.3) loaded on more than one factor. This matrix, however, is not interpreted because an oblique solution has been requested.

Table-7: Component Transformation Matrix Using by the Varimax with Kaiser Normalization Technique of the Important Competitive Factors in the International Market of RMG Business.

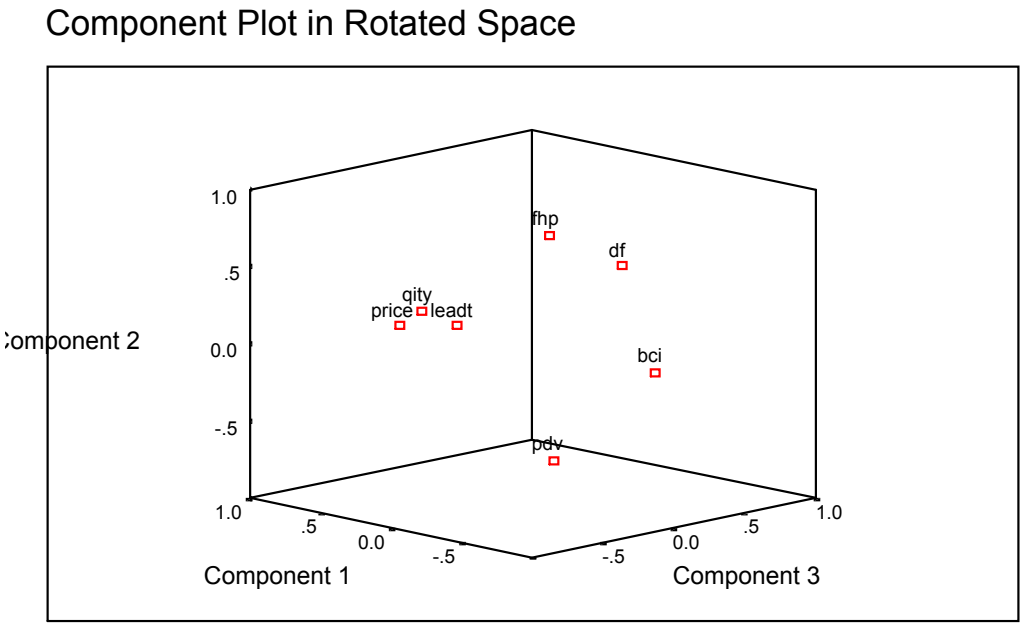
**Component Transformation Matrix**

| Component | 1 | 2 | 3 |
|---|---|---|---|
| 1 | .981 | .182 | -.066 |
| 2 | .179 | -.983 | -.051 |
| 3 | .074 | -.038 | .997 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization

When there are more than two variables, we can think of them as defining a "space," just as two variables defined a plane. Thus, when we have three variables, we could plot a three- dimensional scatter plot, and, again we could fit a plane through the data. With more than three variables it becomes impossible to illustrate the points in a scatter plot, however, the logic of rotating the axes so as to maximize the variance of the new factor remains the same (Figure-4).

Fig.-4: Component Plot in Rotated Space of the Important Competitive Factors in the International Market of RMG Business.




Factor analysis technique has been used in this part of this study to identify the most influential competitive factors of RMG products in the global market. The findings of this study indicated that price; quality and lead-time are the very influential factors in the global RMG business.

## 4. Conclusion

Bangladesh has come a long way in expanding its export trade. This has mostly been possible due to success growth of the RMG sector. The government must accept the fact that if RMG industry collapses, the entire economy of Bangladesh will be collapsed. But needless to say, Bangladesh has no sustainable competitive advantage over its' competitors other than cheap and abundant labor. To expand and maintain foreign market and for the sustainable growth of its RMG industry, Bangladesh has to create sustainable competitive advantage over its' close competitors. It is important for Bangladesh to understand the real strength and weakness and strategies of its competitors. For that the government must undertake a detailed study to prepare a comprehensive strategic plan, which will help Bangladesh for taking specific action plan. So, Bangladesh needs to get ready from now to produce high quality and high value added items ensuring shorter lead time, and low prices through cost reduction strategies and designing broad based overseas marketing network.

## References:

Bauerschmidt, A. (1985). "Common factors underlying barriers to export". *JIBS,* USA, Vol. 6, No. 3.

Berger, J. O. and Berlinger, L.M. (1986). "Robust Bayes and Empirical Bayes Analysis with e-contaminated priors", *The Annals of Statistics*, Vol. 14, No. 2, pp. 461-486.

Bhattacharjee, H. Hossain, M. Afjal, and Bose M. Lal. (1993). "Key Factors Affecting the Export Decision of Garment Products in Bangladesh", *Dhaka University Journal of Business studies*, Vol. 14 (1). pp. 33-46.

Bhattacharjya, D. and Rahman, M. (2001). "Bangladesh's Apparel Sector: Growth Trends and the Post-MFA Challenges", Proceedings of a National Seminar on Readymade Garment Industry, 12-22, January, 2000, BIDS, Dhaka, pp. 2-23.

Bilkey, W.J. (1978). "The export behavior of smaller sized manufacturing firms", *JIBS*, USA, Spring.

Cavusgil, S.T. and Nevin, J. R. (1981). "Internal department of export marketing behavior", *JIBS*, USA, Vol. 18, No. 1.

Czinkota, M.R. (1983). "Exporting: does sales volume make a difference?", *JIBS*, USA, spring/summer.

Dichtl, E. (1984). "The export-decision of small and medium sized firms", *Management International Review,* USA, Vol. 24, No. 2.

Glover, K.A. (1983). "Developing foreign export as a market entry strategy", HBS Case Services, Harvard Business School.

Goodnow, J. (1972). "Environment determinants of overseas market entry strategies"' *JIBS*, USA, spring.

Hayashi, K. (1997). The Press-Shigemasu Bayesian Factor Analysis Model With *Estimated Hyperparameters*. Department of Psychology, University of North Carolina, Chapel Hill, NC 27599.

Hutcheson, Graeme and Nick Sofroniou (1999). *The multivariate social scientist: Introductory statistics using generalized linear models*. Thousand Oaks, CA: Sage Publications.

Kaiser, H.F. and Rice, J. (1974). "Little Jiffy, Mark IV", *Educational and Psychological Measurement*, 34, pp. 111-117.

Kaynak, E. and Kotheri, V. (1984). "Export behavior of small and medium size manufacturers", *Management International Review,* USA, Vol. 24, No. 2.

Lawley, D.N. (1940). "The estimation of factor loadings by the method of maximum likelihood", Proceedings of the Royal Society of Edinburgh, Vol. 60. pp. 64-82..

Lawley, D.N. and A.E. Maxwell (1971). *Factor analysis as a statistical method.* London: Butterworth and Co.

Lee, Fan. (2001). "Textile Industry News", *Journal for Asia on Textile & Apparel,* April/May 2001, Adsale Publishing Company, Hong Kong, p. 6.

Lee, S.E. (1994). Robsustness of Bayesian Factor Analysis Estimates. Ph.D. Thesis, Department of Statistics, University of California, Riverside, CA 92521.

Less. S.E. and S. J. Press (1998). "Robustness of Bayesian Factor Analysis Estimates. Communication in Statistics – Theory and Methods", Vo. 27, No. 8.

Muller, S. (1984). "The export decision of small and medium size firms", *Management International Review,* USA, Vol. 24, No. 2.

Press, S.J. and Shigemasu, K. (1997). Baysian Inference in Factor Analysis-Revised, with an appendix by Rowe, D.B. Technical Report No. 243, Department of statistics, University of California, CA 92521.

Rabino, S. (1980). "An examination of barriers to exporting encountered by smaller manufacturing companies", *Management International Review,* USA, Vol. 20, No. 1.

Reid, S. (1981). "The decision maker and export entry & expansion", *JIBS*, USA, fall.

Rubin, D. and Thayer, D. (1982). "EM Algorithms for ML Factor Analysis", *Psychometrika,* Vol. 47, No. 1, p. 69-76. (There are some typographical errors in this paper in equations 5 and 6).

Siddiqi, Hafiz G.A. (2000). "Beyond 2004: Impact of MFA phase out on the Apparel Industry of Bangladesh", A Key-Note Paper Presented at the BATEXPO Organized by the BGMEA, Dhaka.

Simpson, C.L. (1974). "The export decision process", *JIBS*, USA, spring.