Bangladesh Law and Order Situation: Clustering-Based Discriminant Analysis.

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I. Introduction

In this paper an attempt has been made to analyze people's perception about law and order situation and law enforcing bodies in Bangladesh in the framework of **Clustering-based Discriminant analysis** in addition to descriptive analysis. Interesting outcomes have emerged from the study which are useful for policy makers. Thus, some policy implications have also been provided herein.

The Police of Bangladesh has a glorious involvement in the struggle of freedom in 1971. Many police personnel embraced martyrdom after fighting bravely during the war of independence. In the independent Bangladesh, the police force was reorganized with a program of introducing new discipline, increasing more number of police force and recruiting women staff, etc. Hence the need of assessing community perception about the performance of police force has arisen. Corollary to this assessment, the awareness of the community regarding the incidences of crimes, their types, causes and effects of the criminal activities in the locality, etc need to be studied.

Rationale of the Present Research

One segment of the given data set bears distinctly differentiated groups of respondents. Hence, it necessitates a tool which can befittingly identify factors which contribute to form distinctive groups. One such elegant tool is Discriminant Analysis (DA) and it has been adopted for the present research paper. Such an approach when adopted for a homogenous group of agents renders better insight of a phenomenon. These homogenous groups can be obtained through Cluster Analysis. Thus, clustering-based DA has been adopted for the present research in order to have more reliable findings. Principal purpose of the present research is to adopt a sophisticated multivariate statistical tool namely, Cluster-based Discriminant Analysis, to identify and analyze factors which make distinctly different groups of respondents with respect to some specific issues.

II. Conceptual Framework

For applying Discriminant Analysis following groupings are considered.

Issue 1: It is a public duty to inform police about social crimes. **YES = 1   NO = 2**

Issue 2: Society as a whole should participate in combating social crime. **YES= 1 NO = 2**

Linear Discriminant function

A nominally scaled or criterion variable with one or more explanatory (independent) variables are joined together to form a linear function. Such function can be used to classify an individual into one group or another. Suppose there are p independent discriminating variables. We form a linear function as $D_i = d_o + d_1 X_1 + d_2 X_2 + ... + d_p X_p$.

Here d_i s are weighting Coefficients.

Cluster Analysis

The possible structure of multidimensional data are not apparent and cannot be interpreted immediately, Data structuring by some procedure is necessary and cluster analysis is one such efficient procedure. The chief attraction of clustering (hierarchical) is that boundaries of clusters are not prespecified but are derived according to the patterns in the measurement space.

Dissimilarity of Distance Measure

General formula for distance measure is n-dimensional Euclidean distance measure as given below:

$D_{ij} = \sqrt{[\sum_{k=1}^{n}(X_{ik} - X_{jk})^2]}$, Where, k = number of variables,

X_{ik} = Co-ordinate of point i along axis k, X_{jk} = Co-ordinate of point j along axis k

Now, Average Linkage and Centered methods are easily manageable computationally by using algorithm (s) in existing package like SAS. So, we have decided to use these two methods for our purpose and have used the algorithm available in the SAS package.

III. Data Description

Author of the paper was a member of the study team. A random sample of 3500 respondents at household level using stratified random sampling procedure was selected for face-to-face interview. Here strata comprise of rural-urban area .

IV. Study Results and Analysis
DA Results for Whole Sample

We present discriminant analysis (DA) results by indicators as mentioned before.

Independent Variables used are given below

Age (X_1), Education Level (X_2), Profession (X_3), Idea about Law and Order Situation (X_4), Link of Law Enforcing Agencies with Drug Trafficking (X_5), Types of People involved in drug Trafficking (X_6), Level of trust on_RAB (X_7), Level of trust_on ARMY (X_8), Level of trust on POLICE (X_9), Social Impact of terrorism (X_{10}).

First Discriminating Issue

Group 1: Law enforcing bodies should be informed about any incidence of social crimes (n=2961)

Group 2: Law enforcing bodies should not be informed about any incidence of social crimes (n=539)

Table. 1. Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chisquare	df	Sig
1 through 2	0.866	500.056	57	0
2	0.974	91.219	36	0

Discriminant Function (DF)

$y = -0.017X_1 + 0.007X_2 + 0.047X_3 + 0.197X_4 + 0.195X_5$

$+0.15X_6 + 0.517 X_7 + 0.189X_8 + 0.215X_9 + .118 X_{10}$

Second Discriminating Issue

Group 1: Society as a whole should participate in combating social crimes. (n=3172)

Group 2: Society as a whole should not participate in combating social crimes. (n=328)

Table. 3. Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig
1 through 2	0.853	553.401	38	0
2	0.992	27.613	18	0.068

Discriminant Function

$y =$
$0.004X_1+0.077X_2+0.086X_3+0.121X_4+0.196X_5+0.165X_6+0.563X_7+0.067X_8+0.029X_9+0.137X_{10}$

DA Results by Clusters

DA has been performed after forming homogeneous groups using hierarchical clustering technique. Two large clusters with n_1=2135, n_2=1290 observations were formed. A third cluster with 75 respondents was also formed and it has been ignored. Then, within each cluster we have adopted DA and such results are produced herein.

DA Result for Cluster 1

First Discriminating Issue

Group 1: Law enforcing bodies should be informed about any incidence of social crimes.

Group 2: Law enforcing bodies should not be informed about any incidence of social crimes

Table. 7. Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig
1 through 2	0.866	500.056	57	0
2	0.974	91.219	36	0

Discriminant Function:

$y = -0.017X_1+0.012X_2+0.046X_3+0.197X_4+0.195X_5+$

$0.15X_6+0.517X_7 +.014X_8+.123X_9+.209X_{10}$

Second Discriminating Issue

Group 1: Society as a whole should participate in combating social crimes.

Group 2: Society as a whole should not participate in combating social crimes.
Discriminant Function:
$y = -0.019X_1-0.071X_2-$
$0.012X_3+0.133X_4+0.235X_5+0.118X_6+0.432X_7$
$+0.019X_8+.211X_9+0.012X_{10}$

DA Results for Cluster 2

Group 1: Law enforcing bodies should be informed about any incidence of
social crimes

Group 2: Law enforcing bodies should not be informed about any incidence of social crimes

Table. 11. Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig
1 through 2	0.853	553.401	38	0
2	0.992	27.613	18	0.068

Discriminant Function

$y=0.004X_1+0.077X_2+0.066X_3+0.121X_4+0.196X_5$
$+0.165X_6+0.563X_7 +0.067X_8-0.019X_9-0.137X_{10}$

Second Discriminating Issue:

Group 1: Society as a whole should participate in combating social crimes.

Group 2: Society as a whole should not participate in combating social crimes.

Discriminant Function:

$y =-0.015X_1-0.061X_2-$
$0.013X_3+0.143X_4+0.255X_5+0.128X_6+0.332X_7$
$+0.029X_8+0.021X_9+0.032X_{10}$

Trust on RAB is the most important factor which keeps positive impact on the likelihood of a respondent to favor social participation is combating social crimes. In fact trust level on law enforcing agencies bears positive impact on the likelihood of favoring social mobilization against social crimes. Second such factor is the perception that some section of law enforcing agencies keeps links with drug trafficking. It is also clear that serious social impact of terrorism perceived by respondents.

V. Conclusion and Policy Implications

In the present paper an attempt has been made to make an analysis of people's perceptions about law and order situation as well as about law enforcing agencies. As an analysis tool we have used 2-group based Discriminant Analysis in addition to descriptive analysis. As a gist it can be said that analysis of results of both whole sample as well as cluster wise sample indicate the followings. (i) various types of serious crimes exist in the society (ii) People are not happy enough with law enforcing bodies (iii) Community should be motivated to collectively come forward to resist antisocial activity.(iv)Law enforcing bodies should be more dependable for taking stern and tough action against social crimes. Thus, police options should be based on such findings. Such policies may be (1) To generate, strengthen and sustain trust of people in law enforcing agencies through their loyal activities (2) Proper support should be provided to community level social organization (3) Stern actions should be taken against miscreants as well as against those members of law enforcing agencies who bear links with antisocial forces.

(iv) Strong binding Co-operations among Army, BDR, RAB and Police are very much needed

(v) Strong Management Information System (MIS) can be of great help and use.

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