Question 1.
A factor analysis was formed on the results of a questionnaire on ten automobiles by 303 MBA students.

The basic description of the questionnaire result is as follows:

## Descriptive Statistics

|  | M ean | Std. Deviation | A nalysis N |
| :--- | ---: | ---: | ---: |
| 01 Exciting | 3.21 | 1.218 | 294 |
| 02 Dependable | 3.65 | 1.020 | 294 |
| 03 Luxurious | 3.48 | 1.107 | 294 |
| 04 Outdoorsy | 2.68 | 1.398 | 294 |
| 05 Powerful | 3.60 | 1.016 | 294 |
| 06 Stylish | 3.44 | 1.237 | 294 |
| 07 Comfortable | 3.70 | .851 | 294 |
| 08 Rugged | 2.53 | 1.329 | 294 |
| 09 Fun | 3.48 | 1.263 | 294 |
| 10 Safe | 3.75 | .979 | 294 |
| 11 Performance | 3.44 | 1.181 | 294 |
| 12 Family | 3.46 | 1.286 | 294 |
| 13 Versatile | 3.08 | 1.093 | 294 |
| 14 Sports | 3.03 | 1.318 | 294 |
| 15 Status | 3.57 | 1.183 | 294 |
| 16 Practical | 3.35 | 1.106 | 294 |

To ensure that it is appropriate to use factor analysis, the anti-image correlation matrix, Barlett's test of sphericity, and measure of sampling adequacy tests are conducted.

The Barlett's test of sphericity indicates that the correlations among the variables are significant, with approximate Chi-square of 3364.72 . The MSA ndex of 0.880 also indicates high correlations among the variables.

KMO and Bartlett's Test

| K aiser-M eyer-Olkin M easure of Sampling A dequacy. | .880 |  |
| :--- | :--- | ---: |
| B artlett's Test of Sphericity | Approx. Chi-Square | 3364.722 |
|  | df | 120 |
|  | Sig. | .000 |

The anti－image correlation matrix table below indicates that all variables have relatively low anti－image correlations with the other variables，indicating that the data is not unsuitable for factor analysis．A review of the anti－image covariance and anti－image correlation indicates that most anti－image covariance and anti－image correlation are less than 0.10 ．The only extreme observations are the anti－image correlations between （a）rugged and outdoorsy，and（b）family and practical with -0.608 and -0.390 respectively．The high anti－image correlations might be due to their close association in the description of the vehicles．

|  |  | O 0 0 0 0 0 |  |  | 8 0 0 $\frac{8}{8}$ $\frac{0}{2}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & \stackrel{0}{0} \end{aligned}$ | $\begin{aligned} & 8 \\ & \text { \& } \\ & \text { 弇 } \end{aligned}$ | $\begin{aligned} & 9 \\ & 0 \\ & \frac{1}{8} \\ & \frac{0}{0} \\ & \frac{8}{0} \end{aligned}$ | $\begin{aligned} & \text { Q } \\ & \text { た} \\ & \text { 若 } \end{aligned}$ | $\begin{aligned} & 8 \\ & 5 \\ & 5 \end{aligned}$ | $\begin{gathered} \stackrel{\rightharpoonup}{0} \\ \stackrel{y}{0} \end{gathered}$ |  | $\begin{aligned} & \text { N } \\ & \stackrel{N}{N} \\ & \stackrel{3}{3} \end{aligned}$ | $\begin{aligned} & \text { b } \\ & \stackrel{C}{6} \\ & \frac{0}{0} \end{aligned}$ |  |  | W 0 0 0 0 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Anti－image Covariance | 01 Exciting | ． 227 | ． 018 | －． 025 | －． 039 | ． 030 | －． 053 | ． 032 | －． 007 | －． 104 | ． 023 | －． 030 | ． 023 | ． 020 | －． 011 | －． 002 | －． 010 |
|  | 02 Dependable | ． 018 | ． 586 | －． 095 | ． 017 | －． 005 | －． 007 | －． 014 | －． 024 | －． 023 | －． 147 | －． 042 | －． 031 | ． 050 | ． 019 | ． 004 | －． 084 |
|  | 03 Luxurious | －． 025 | －． 095 | ． 356 | ． 039 | －． 051 | －． 062 | ． 113 | ． 028 | ． 010 | －． 031 | ． 024 | －． 011 | ． 005 | ． 013 | －． 078 | ． 050 |
|  | 04 Outdoorsy | －． 039 | ． 017 | ． 039 | ． 313 | －． 077 | ． 029 | －． 020 | －． 186 | ． 004 | ． 023 | ． 036 | －． 018 | －． 040 | －． 015 | －． 012 | －． 005 |
|  | 05 Powerful | －． 030 | －． 005 | －． 051 | －． 077 | ． 405 | ． 013 | －． 021 | －． 028 | －． 032 | －． 007 | －． 112 | ． 010 | －． 022 | －． 012 | ． 014 | ． 008 |
|  | 06 Stylish 07 Comfortable | $\begin{array}{r} -.053 \\ .032 \end{array}$ | $\begin{aligned} & -.007 \\ & -.014 \end{aligned}$ | $\begin{aligned} & -.062 \\ & -.113 \end{aligned}$ | $\begin{array}{r} .029 \\ .020 \end{array}$ | $\begin{gathered} -.013 \\ -.021 \end{gathered}$ | $\begin{array}{r} .233 \\ . .042 \end{array}$ | $\begin{array}{r} -.042 \\ .480 \end{array}$ | $\begin{aligned} & -.016 \\ & -.004 \end{aligned}$ | $\begin{aligned} & . .026 \\ & .041 \end{aligned}$ | $\begin{array}{r} .042 \\ .149 \end{array}$ | $\begin{array}{r} -.017 \\ .007 \end{array}$ | $\begin{array}{r} .023 \\ .023 \end{array}$ | $\begin{aligned} & -.015 \\ & -.035 \end{aligned}$ | $\begin{array}{r} -.033 \\ .076 \end{array}$ | $\begin{aligned} & -.078 \\ & -.010 \end{aligned}$ | -.020 .041 |
|  | 08 Rugged | －． 007 | －． 024 | ． 028 | －． 186 | －． 028 | －． 016 | －． 004 | ． 299 | ． 009 | －． 052 | ． 060 | ． 019 | －． 052 | －． 088 | ． 006 | ． 023 |
|  | 09 Fun | －． 104 | －． 023 | ． 010 | ． 004 | －． 032 | －． 026 | －． 041 | ． 009 | ． 239 | －． 003 | ． 000 | ． 023 | －． 018 | －． 071 | －． 021 | ． 015 |
|  | 10 Safe | ． 023 | －． 147 | －． 031 | ． 023 | －． 007 | ． 042 | －． 149 | －． 052 | －． 003 | ． 461 | ． 0664 | －． 044 | －． 019 | ． 031 | －． 025 | －． 036 |
|  | 11 Performance | ． 030 | －． 042 | ． 024 | ． 036 | －． 112 | －． 017 | ． 007 | ． 060 | ． 000 | ． 064 | ． 322 | －． 015 | ． 014 | －． 063 | －． 095 | ． 029 |
|  | 12 Family | ． 023 | －． 031 | －． 011 | －． 018 | ． 010 | ． 023 | －． 023 | －． 019 | ． 023 | －． 044 | －． 015 | ． 280 | －． 102 | ． 055 | ． 039 | －． 133 |
|  | 13 Versatile | ． 020 | ． 050 | ． 005 | －． 040 | －． 022 | －． 015 | －． 035 | －． 052 | －． 018 | －． 019 | ． 014 | －． 102 | 471 | －． 045 | ． 000 | － 120 |
|  | 14 Sports | －． 011 | ． 019 | ． 013 | －． 015 | －． 012 | －． 033 | ． 076 | －． 088 | －． 071 | ． 031 | －． 063 | ． 055 | －． 045 | ． 329 | ． 003 | －． 006 |
|  | 15 Status | －． 002 | ． 004 | －． 078 | －． 012 | ． 014 | －． 078 | － 010 | ． 006 | －． 021 | －． 025 | －． 095 | ． 039 | ． 000 | ． 033 | ． 266 | －． 013 |
|  | 16 Practical | －． 010 | －． 084 | ． 050 | －． 005 | ． 008 | －． 020 | －． 041 | ． 023 | ． 015 | －． 036 | ． 029 | －． 133 | ． 120 | －． 006 | －． 013 | ． 419 |
| Anti－image Correlation | 01 Exciting | ．916（a） | ． 050 | －． 088 | －． 148 | －． 100 | －． 232 | ． 096 | －． 029 | ． 448 | ． 073 | －． 110 | ． 092 | ． 062 | －． 039 | －． 007 | －． 034 |
|  | 02 Dependable | ． 050 | 839（a） | －． 207 | ． 039 | －． 011 | －． 020 | －． 027 | －． 056 | －． 062 | －． 283 | －． 097 | －． 077 | ． 095 | ． 044 | ． 010 | －． 169 |
|  | 03 Luxurious | －． 088 | － 207 | ．890（a） | ． 118 | －． 134 | －． 213 | －． 274 | ． 084 | ． 035 | －． 077 | ． 071 | －． 036 | ． 011 | ． 037 | －． 255 | ． 129 |
|  | 04 Outdoorsy | － 148 | ． 039 | ． 118 | ．710（a） | －． 217 | ． 108 | －． 052 | －． 608 | ． 015 | ． 061 | ． 113 | －． 061 | － 103 | －． 048 | －． 041 | －． 013 |
|  | 05 Powerful | －． 100 | －． 011 | －． 134 | －． 217 | ．931（a） | －． 043 | －． 047 | －． 080 | －． 102 | －． 016 | －． 310 | ． 029 | －． 050 | －． 032 | ． 044 | ． 019 |
|  | 06 Stylish | －． 232 | －． 020 | －． 213 | ． 108 | －． 043 | ．928（a） | －． 124 | －． 059 | －． 112 | ． 129 | －． 063 | ． 092 | －． 044 | －． 119 | －． 313 | －． 065 |
|  | 07 Comfortable | ． 096 | －． 027 | －． 274 | －． 052 | －． 047 | － 124 | ．816（a） | －． 010 | －． 121 | －． 318 | ． 019 | －． 062 | －． 074 | ． 192 | －． 027 | －． 091 |
|  | 08 Rugged | －． 029 | －． 056 | ． 084 | －． 608 | －． 080 | －． 059 | －． 010 | ．695（a） | ． 033 | －． 141 | ． 194 | ． 065 | －． 138 | －． 280 | ． 021 | ． 066 |
|  | 09 Fun | －． 448 | －． 062 | ． 035 | ． 015 | －． 102 | －． 112 | －． 121 | ． 033 | ．917（a） | －． 010 | ． 001 | ． 089 | －． 053 | －．254 | －． 083 | ． 048 |
|  | 10 Safe | ． 073 | －． 283 | －． 077 | ． 061 | －． 016 | ． 129 | －． 318 | －． 141 | －． 010 | 810（a） | －． 165 | －． 123 | －． 041 | ． 080 | －． 072 | －． 082 |
|  | 11 Performance | ． 110 | －． 097 | ． 071 | ． 113 | －． 310 | －． 063 | ． 019 | ． 194 | ． 001 | －． 165 | ．896（a） | －． 049 | ． 036 | －． 194 | －． 324 | ． 080 |
|  | 12 Family | ． 092 | －． 077 | －． 036 | －． 061 | ． 029 | ． 092 | －． 062 | －． 065 | ． 089 | －． 123 | －． 049 | 893（a） | －． 280 | ． 182 | ． 142 | －． 390 |
|  | 13 Versatile | ． 062 | ． 095 | ． 011 | －． 103 | －． 050 | －． 044 | －． 074 | －． 138 | －． 053 | －． 041 | ． 036 | －． 280 | ．858（a） | －． 114 | －． 001 | －． 271 |
|  | 14 Sports | －． 039 | ． 044 | ． 037 | －． 048 | －． 032 | －． 119 | ． 192 | －． 280 | －． 254 | ． 080 | －． 194 | ． 182 | －． 114 | ．902（a） | ． 010 | －． 017 |
|  | 15 Status 16 Practical | $\begin{gathered} -.007 \\ -0.034 \end{gathered}$ | $\begin{array}{r} .010 \\ .169 \end{array}$ | $\begin{array}{r} -.255 \\ .129 \end{array}$ | $\begin{aligned} & -.041 \\ & -.013 \end{aligned}$ | $.044$ | $\begin{aligned} & -.313 \\ & -.065 \end{aligned}$ | $. .027$ | $\begin{aligned} & .021 \\ & .066 \end{aligned}$ | $\begin{array}{r} .083 \\ .048 \end{array}$ | $-.072$ | $\begin{array}{r} -.324 \\ .080 \end{array}$ | $\begin{array}{r} .142 \\ .390 \end{array}$ | $\begin{aligned} & -.001 \\ & -.271 \end{aligned}$ | $\begin{array}{r} .010 \\ .017 \end{array}$ | ．919（a） | $\begin{array}{r} .038 \\ \hline \end{array}$ |

The correlation matrix of the variables are indicated below.

Correlation Matrix

|  |  |  | $\begin{aligned} & 0_{0}^{0} \\ & \mathbf{Q}^{\circ} \\ & \frac{8}{0} \\ & \frac{8}{0} \end{aligned}$ | $\begin{aligned} & \text { K } \\ & \text { E. } \\ & \text { E. } \\ & \text { O. } \end{aligned}$ | $\begin{aligned} & 0 \\ & \frac{0}{0} 8 \\ & \frac{0}{8} 8 \\ & \frac{1}{5} \end{aligned}$ | 8 0 0 0 0 0 |  | $\begin{aligned} & \frac{0}{2} \\ & \frac{1}{0} \\ & \frac{1}{6} \\ & \frac{0}{0} \end{aligned}$ | $\begin{aligned} & \text { Q } \\ & \text { D } \\ & \text { 蓇 } \end{aligned}$ | $\begin{aligned} & 8 \\ & \frac{8}{5} \end{aligned}$ |  | 0 0 0 0 3 0 0 0 |  | $\begin{aligned} & \stackrel{\rightharpoonup}{\omega} \\ & \stackrel{0}{\phi} \\ & \stackrel{1}{6} \\ & \frac{0}{0} \end{aligned}$ | $\begin{aligned} & \stackrel{\rightharpoonup}{n} \\ & \frac{u}{8} \\ & \frac{1}{6} \end{aligned}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Correlation | 01 Exciting | 1.000 | . 026 | . 458 | . 192 | . 636 | . 754 | . 045 | . 175 | . 828 | -. 148 | . 614 | -. 569 | -. 144 | . 672 | . 650 | -. 351 |
|  | 02 Dependable | . 026 | 1.000 | . 402 | -. 062 | . 162 | . 169 | . 453 | -. 002 | . 090 | . 542 | . 232 | . 217 | . 123 | -. 086 | . 225 | . 298 |
|  | 03 Luxurious | . 458 | . 402 | 1.000 | -. 191 | . 438 | . 639 | . 470 | -. 157 | . 474 | . 264 | . 554 | -. 271 | -. 131 | . 210 | . 675 | -. 150 |
|  | 04 Outdoorsy | . 192 | -. 062 | -. 191 | 1.000 | . 324 | . 003 | . 018 | . 798 | . 148 | . 018 | -. 127 | . 156 | . 444 | . 341 | -. 071 | . 170 |
|  | 05 Powerful | . 636 | . 162 | . 438 | . 324 | 1.000 | . 593 | . 214 | . 302 | . 632 | . 081 | . 585 | -. 311 | . 066 | . 550 | . 539 | -. 158 |
|  | 06 Stylish | . 754 | . 169 | . 639 | . 003 | . 593 | 1.000 | . 233 | . 038 | . 746 | -. 020 | . 677 | -. 522 | -. 137 | . 574 | . 785 | -. 283 |
|  | 07 Comfortable | . 045 | . 453 | . 470 | . 018 | . 214 | . 233 | 1.000 | . 046 | . 129 | . 581 | . 194 | . 242 | . 247 | -. 120 | . 269 | . 308 |
|  | 08 Rugged | . 175 | -. 002 | -. 157 | . 798 | . 302 | . 038 | . 046 | 1.000 | . 153 | . 091 | -. 127 | . 168 | . 468 | . 383 | -. 060 | . 179 |
|  | 09 Fun | . 828 | . 090 | . 474 | . 148 | . 632 | . 746 | . 129 | . 153 | 1.000 | -. 074 | . 618 | -. 545 | -. 105 | . 684 | . 667 | -. 327 |
|  | 10 Safe | -. 148 | . 542 | . 264 | . 018 | . 081 | -. 020 | . 581 | . 091 | -. 074 | 1.000 | . 106 | . 418 | . 303 | -. 216 | . 091 | . 423 |
|  | 11 <br> Performance | . 614 | . 232 | . 554 | -. 127 | . 585 | . 677 | . 194 | -. 127 | . 618 | . 106 | 1.000 | -. 444 | -. 202 | . 470 | . 735 | -. 284 |
|  | 12 Family | -. 569 | . 217 | -. 271 | . 156 | -. 311 | -. 522 | . 242 | . 168 | -. 545 | . 418 | -. 444 | 1.000 | . 546 | -. 495 | -. 489 | . 704 |
|  | 13 V ersatile | -. 144 | . 123 | -. 131 | . 444 | . 066 | -. 137 | . 247 | . 468 | -. 105 | . 303 | -. 202 | . 546 | 1.000 | . 003 | -. 176 | . 564 |
|  | 14 Sports | . 672 | -. 086 | . 210 | . 341 | . 550 | . 574 | -. 120 | . 383 | . 684 | -. 216 | . 470 | -. 495 | . 003 | 1.000 | . 464 | -. 302 |
|  | 15 Status | . 650 | . 225 | . 675 | -. 071 | . 539 | . 785 | . 269 | -. 060 | . 667 | . 091 | . 735 | -. 489 | -. 176 | . 464 | 1.000 | -. 270 |
|  | 16 Practical | -. 351 | . 298 | -. 150 | . 170 | -. 158 | -. 283 | . 308 | . 179 | -. 327 | . 423 | -. 284 | . 704 | . 564 | -. 302 | -. 270 | 1.000 |

Based on the scree plot which shows a sharp drop in eigenvalue by the fourth component and the eigenvalue of $5.927,3.187$ and 2.542 for the first three components (and dropping to 0.648 by the fourth component), 3 principal components will be used.

Total variance explained by these 3 principal components is $72.8 \%$.

## Scree Plot



Total V ariance Explained

| Component | Initial Eigenvalues |  |  | Extraction Sums of Squared Loadings |  |  | Rotation Sums of Squared Loadings |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Total | \% of V ariance | Cumulative \% | Total | \% of V ariance | Cumulative \% | Total | \% of V ariance | Cumulative \% |
| 1 | 5.927 | 37.042 | 37.042 | 5.927 | 37.042 | 37.042 | 5.915 | 36.966 | 36.966 |
| 2 | 3.187 | 19.920 | 56.961 | 3.187 | 19.920 | 56.961 | 3.030 | 18.940 | 55.906 |
| 3 | 2.542 | 15.887 | 72.849 | 2.542 | 15.887 | 72.849 | 2.711 | 16.942 | 72.849 |
| 4 | . 648 | 4.052 | 76.901 |  |  |  |  |  |  |
| 5 | . 589 | 3.684 | 80.585 |  |  |  |  |  |  |
| 6 | . 477 | 2.983 | 83.568 |  |  |  |  |  |  |
| 7 | . 406 | 2.539 | 86.107 |  |  |  |  |  |  |
| 8 | . 369 | 2.307 | 88.414 |  |  |  |  |  |  |
| 9 | . 337 | 2.107 | 90.521 |  |  |  |  |  |  |
| 10 | . 296 | 1.852 | 92.373 |  |  |  |  |  |  |
| 11 | . 277 | 1.729 | 94.102 |  |  |  |  |  |  |
| 12 | . 242 | 1.510 | 95.613 |  |  |  |  |  |  |
| 13 | . 205 | 1.282 | 96.895 |  |  |  |  |  |  |
| 14 | . 185 | 1.154 | 98.049 |  |  |  |  |  |  |
| 15 | . 169 | 1.054 | 99.103 |  |  |  |  |  |  |
| 16 | . 144 | . 897 | 100.000 |  |  |  |  |  |  |

For the factor analysis, principal component analysis and varimax rotation was used.
Rotated Component Matrix (a)

|  | Component |  |  |
| :---: | :---: | :---: | :---: |
|  | 1 | 2 | 3 |
| 01 Exciting | . 876 |  |  |
| 02 Dependable |  | . 736 |  |
| 03 Luxurious | . 661 | . 452 |  |
| 04 Outdoorsy |  |  | . 892 |
| 05 Powerful | . 750 |  |  |
| 06 Stylish | . 887 |  |  |
| 07 Comfortable |  | . 785 |  |
| 08 Rugged |  |  | . 893 |
| 09 Fun | . 879 |  |  |
| 10 Safe |  | . 825 |  |
| 11 Performance | . 798 |  |  |
| 12 Family | -. 648 | . 526 |  |
| 13 V ersatile |  |  | . 678 |
| 14 Sports | . 720 |  |  |
| 15 Status | . 845 |  |  |
| 16 Practical | -. 421 | . 595 |  |

Extraction M ethod: Principal Component A nalysis. Rotation M ethod: V arimax with K aiser Normalization.
a Rotation converged in 6 iterations.

The 3 principal components for the factor analysis can be described as:
(1) Sportiness and Style. This component encompasses the fun, speed and luxurious factors of perception; this component includes the variables of exciting, luxurious, powerful, stylish, fun, performance, sports and status.
(2) Family. This component encompasses the family aspect of the perception; this component includes dependability, comfortable, safe, family, and practical.
(3) Outdoor Use. This component encompasses the outdoor rugged used of certain outdoor vehicles; this component includes outdoorsy, ruggedness, and versatility.

Question 2.
A correspondence analysis of newspaper readership is performed based on occupation of readers. The data are from the 1999 Eurobarometer Survey. The newspapers are further categorized based on their political orientation as described in the question as follow:

| Newpsaper Name | Categorization in analysis |
| :--- | :--- |
| Daily Mirror | Left 1 |
| Sun | Left 2 |
| Daily / Sunday Mail | Right 1 |
| Daily / Sunday Express | Right 2 |
| Times / Sunday Times | Middle |
| Daily / Sunday Telegraph | Right 3 |
| Guardian | Left 3 |

The count of readership is first weighted in SPSS. The descriptions of the readership is shown below.

| Correspondence Table |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | NEWS |  |  |  |  |  |  |  |  |  |
| OCCU | Left 1 | Left 2 | Right 1 | Right 2 | Middle | Right 3 | Left 3 | Other | None | Active M argin |
| Self-employed | 8 | 16 | 12 | 6 | 6 | 4 | 7 | 2 | 6 | 67 |
| M anager | 9 | 14 | 19 | 8 | 17 | 10 | 18 | 12 | 9 | 116 |
| White collar | 20 | 20 | 20 | 9 | 7 | 10 | 6 | 12 | 8 | 112 |
| M anual | 90 | 103 | 34 | 28 | 10 | 4 | 7 | 30 | 28 | 334 |
| House keep | 51 | 64 | 19 | 9 | 9 | 4 | 6 | 24 | 29 | 215 |
| Unemployed | 22 | 30 | 6 | 1 | 2 | 3 | 5 | 12 | 11 | 92 |
| Retired | 60 | 50 | 52 | 31 | 8 | 19 | 7 | 48 | 31 | 306 |
| Student | 15 | 17 | 10 | 5 | 10 | 3 | 7 | 11 | 6 | 84 |
| Active M argin | 275 | 314 | 172 | 97 | 69 | 57 | 63 | 151 | 128 | 1326 |

Summary

| Dimension | Singular V alue | Inertia | Chi Square | Proportion of Inertia |  |  | Confidence Singular V alue |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Sig. | A ccounted for | Cumulative | Standard Deviation | Correlation <br> 2 |
| 1 | . 314 | . 099 |  |  | . 641 | . 641 | . 029 | . 119 |
| 2 | . 189 | . 036 |  |  | . 233 | . 874 | . 027 |  |
| 3 | . 104 | . 011 |  |  | . 070 | . 944 |  |  |
| 4 | . 070 | . 005 |  |  | . 032 | . 976 |  |  |
| 5 | . 048 | . 002 |  |  | . 015 | . 991 |  |  |
| 6 | . 035 | . 001 |  |  | . 008 | . 999 |  |  |
| 7 | . 012 | . 000 |  |  | . 001 | 1.000 |  |  |
| Total |  | . 154 | 204.230 | .000(a) | 1.000 | 1.000 |  |  |

[^0]Overview Row Points(a)

| OCCU | M ass | Score in Dimension |  | Inertia | Contribution |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Of Point to Inertia of Dimension |  | Of Dimension to Inertia of Point |  |  |
|  |  | 1 | 2 |  | 1 | 2 | 1 | 2 | Total |
| Self-employed | . 051 | . 640 | -. 339 | . 011 | . 066 | . 031 | . 575 | . 097 | . 672 |
| M anager | . 087 | 1.359 | -. 387 | . 053 | . 514 | . 069 | . 949 | . 046 | . 996 |
| W hite collar | . 084 | . 410 | . 356 | . 008 | . 045 | . 056 | . 544 | . 247 | . 791 |
| M anual | . 252 | -. 508 | -. 145 | . 025 | . 207 | . 028 | . 802 | . 039 | . 841 |
| House keep | . 162 | -. 412 | -. 300 | . 014 | . 088 | . 077 | . 622 | . 199 | . 821 |
| Unemployed | . 069 | -. 403 | -. 459 | . 011 | . 036 | . 077 | . 334 | . 261 | . 595 |
| Retired | . 231 | . 031 | . 707 | . 022 | . 001 | . 609 | . 003 | . 972 | . 975 |
| Student | . 063 | . 468 | -. 399 | . 009 | . 044 | . 053 | . 506 | . 221 | . 727 |
| A ctive Total | 1.000 |  |  | . 154 | 1.000 | 1.000 |  |  |  |

Overview Column Points(a)

| NEWS | Score in Dimension |  |  | Inertia | Contribution |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | M ass | 1 | 2 |  | Of Point to Inertia of Dimension |  | Of Dimension to Inertia of Point |  |  |
|  |  |  |  |  | 1 | 2 | 1 | 2 | Total |
| Left 1 | . 207 | -. 476 | -. 021 | . 015 | . 150 | . 000 | . 957 | . 001 | . 958 |
| Left 2 | . 237 | -. 444 | -. 387 | . 022 | . 148 | . 188 | . 663 | . 305 | . 968 |
| Right 1 | . 130 | . 379 | . 463 | . 012 | . 059 | . 147 | . 484 | . 436 | . 920 |
| Right 2 | . 073 | . 111 | . 587 | . 009 | . 003 | . 133 | . 031 | . 520 | . 551 |
| M iddle | . 052 | 1.160 | -. 728 | . 029 | . 223 | . 146 | . 761 | . 181 | . 941 |
| Right 3 | . 043 | . 969 | . 687 | . 018 | . 128 | . 107 | . 688 | . 208 | . 896 |
| Left 3 | . 048 | 1.356 | -. 851 | . 035 | . 278 | . 182 | . 793 | . 188 | . 981 |
| Other | . 114 | -. 017 | . 400 | . 009 | . 000 | . 096 | . 001 | . 401 | . 402 |
| None | . 097 | -. 186 | -. 039 | . 005 | . 011 | . 001 | . 226 | . 006 | . 232 |
| A ctive Total | 1.000 |  |  | . 154 | 1.000 | 1.000 |  |  |  |

a Symmetrical normalization

The output of the correspondence analysis is shown below.


Based on the result of the correspondence analysis, the occupation and the readership can be described as forming three approximate clusters:
(1) Manueltype labor / unemployed read left-of-centre type newspapers like the Daily Mirror or the Sun or they do not read any newspaper. As can be seen in the cluster on the left, manual workers and house keepers and the unemployed respondents likely to read Daily Mirror or the Sun. Many also responded that they do not read any of the newspapers listed in the survey.
(2) White collar / retired read right-of-centre or other newspapers. As can be seen in the cluster on the top center, white collar workers and retirees most likely to read right-of-centre newspapers like the Daily. They are also likely to read the "other" types of newspapers as described in the survey.
(3) Self-employed / student most likely to read either the left-of-centre newspapers or the Times or the Guardian. Since the self-employed and the student lies between the left-of-centre newspaper and the Times, they are most likely to read these types of newspapers.
(4) Managers likely to read the Times, the Guardian or the right-of-centre newspaper.

## Question 4.

Perceived academic performance and perceived attractiveness of 207 boys are studied and structural equation modeling is used to determine relationship within this construct. The relationships of the variables are shown in Figure 1 below.

The regression weights from SPSS are shown below. Based on the SEM model, the relationship between height - perceived attractiveness and perceived attractive perceived academic performance might not be significant. The height - perceived attractiveness relationship has $p$-value of 0.066 and perceived attractive - perceived academic performance has p -value of 0.603 . They are shown in italics below.

The model is estimated to be:

## academic $=0.022$ GPA +.0017 attractiveness

$$
\text { attractivenss }=0.018 \text { height }-0.004 \text { weight }+0.099 \text { rating }+1.274 \text { academic }
$$

For perceived academic performance, since attractiveness is not significant, it can be explained solely by level of GPA - which is more or less an expected result.

For perceived attractiveness, rating of attractiveness by others, perceived academic performance, are positively related to attractiveness. Weight is negatively related to attractiveness as thinner people are perceived to be more attractiveness. Although not significant statistically, taller people are perceived to be more attractive.

Regression Weights

|  |  |  | Estimate | S.E. | C.R. | P |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| ACADEMIC | $<--$ | GPA | 0.022 | 0.002 | 9.197 | 0.000 |
| ATTRACT | $<--$ | HEIGHT | 0.018 | 0.010 | 1.838 | 0.066 |
| ATTRACT | $<-$ | WEIGHT | -0.004 | 0.001 | -2.491 | 0.013 |
| ATTRACT | $<--$ | RATING | 0.099 | 0.030 | 3.261 | 0.001 |
| ATTRACT | $<--$ | ACADEMIC | 1.274 | 0.286 | 4.461 | 0.000 |
| ACADEMIC | $<--$ | ATTRACT | 0.017 | 0.032 | 0.520 | 0.603 |

Based on this model, $30.5 \%$ of perceived attractiveness is explained by height, weight, rating, and perceived academic performance; while $36.8 \%$ of perceived academic performance is explained by the variables of GPA and perceived attractiveness.

Squared Multiple Correlations

|  | Estimate |
| :--- | :--- |
| ATTRACT | 0.305 |
| ACADEMIC | 0.368 |

The Fit Measures of the SEM is attached at the end. But an overall evaluation of how well the model provides an acceptable fit to the data can be determined by the following measures.
(a) Chi-square of 1.139 , which is not significant.
(b) GFI of 0.998 indicating good fit as it is greater than 0.9.
(c) Adjusted GFI of 0.987 indicating good fit as it is greater than 0.8.
(d) RMR of 0.05 indicating good fit as it is lower than 0.10 .
(e) RMSEA of 0.079 at the upper bound indicating good fit as it is lower than 0.10.
(f) CFI index of 1.0 indicating good fit as it is greater than 0.9.

Figure 2 below provides the unstandardized correlation coefficient and Figure 3 below provides the standardized correlation coefficient output based on the SPSS SEM.

Figure 1.


Figure 2.


Figure 3.



[^0]:    a 56 degrees of freedom

