Faktör Analizi

Hipotez testlerinden farklı olarak, faktör analizi bir very azaltma yöntemidir.

Bu yöntem ile büyük bir very setindeki çok sayıda değişkenden, daha az sayıda değişkenin türetilmesi mümkündür.

Bu yöntemde değişkenler arasındaki korelasyonların nasıl yığınlar oluşturduğu ve gruplaştığı analiz edilir.

Faktör analizi, tek başına bir analiz olarak kullanılmak yerine, bir dizi istatistiksel analizin ara aşaması olarak kullanılabilir.

Özellikle ölçek geliştirme ile ilgili araştırmalarda faktör analizinden faydalanılabilir.

Bu durumda, çok sayıda ölçek maddesinden daha az sayıda, yönetilebilir bir değişken seti oluşturmak mümkündür.

Bu derste, farklı yöntemler içerisinden, temel bileşenler analizi (Principal Component Analysis) gösterilecektir.

**Faktör Analizinin Aşamaları**

1. Bu analizin uygulanabilmesi için, öncelikle very setinin faktörleştirilebilir olup olmadığı control edilmelidir.
2. İkinci adımda faktör çıkarma yapılır. Bu aşamada kaç faktör çıkarılabileceğini denetlenir.
3. Son olarak, değişkenlerin hangi faktörler içerisinde toplandığı yorumlanacaktır.

**Verilerin Yorumlanması**

Veri setinin faktörleştirilebilir olup olmadığının belirlenebilmesi için Kaiser-Meyer-Olkin ölçütünün (KMO) 0.6 ya da daha fazla olması beklenir. Bartlett testinin de 0.05 düzeyinde anlamlılığa sahip olması control edilmelidir.

İkinci adımda, kaç faktörün olluştuğunun tespiti için, Total Variance Explained sütunundaki özdeğerlerin kaç tanesinin 1 ya da daha fazla olduğuna bakılmalıdır. Aynı tabloda, bu faktör sayısıyla toplam varyansın ne kadarının açıklanabildiği de görülür.

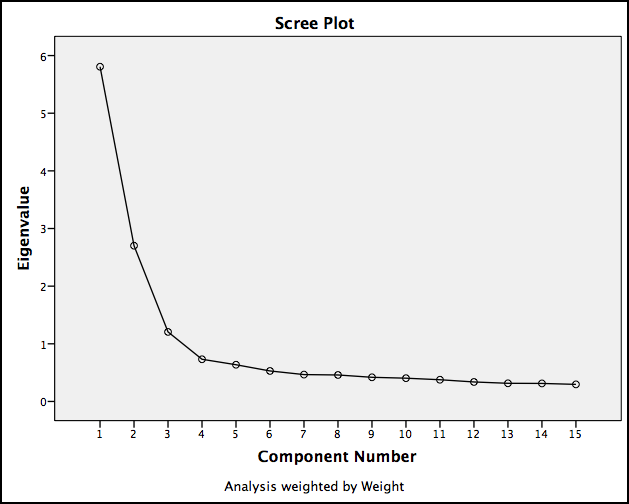
Üçüncü adımda da, Pattern Matrix’te görülen değişkenlerin hangi faktör içerisine yerleştiği incelenir. Birden fazla faktöre yüklenen değişkenler söz konusuysa, yük miktarının 0.3’ten fazla olduğu değişkenler tercih edilebilir. Her bir bileşenin üç ya da daha fazla değişken tarafından yüklenmiş olmasına dikkat edilmelidir.

**ÖRNEK 1**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Descriptive Statistics** | | | | | | |  | N | Minimum | Maximum | Mean | Std. Deviation | | Justifiable: Claiming government benefits to which you are not entitled | 82711 | 1 | 10 | 2.80 | 2.536 | | Justifiable: Avoiding a fare on public transport | 83375 | 1 | 10 | 2.65 | 2.392 | | Justifiable: Stealing property | 83763 | 1 | 10 | 1.80 | 1.769 | | Justifiable: Cheating on taxes if you have a chance | 78750 | 1 | 10 | 2.26 | 2.131 | | Justifiable: Someone accepting a bribe in the course of their duties | 83456 | 1 | 10 | 1.95 | 1.880 | | Justifiable: Homosexuality | 78241 | 1 | 10 | 3.35 | 3.052 | | Justifiable: Prostitution | 59073 | 1 | 10 | 2.85 | 2.524 | | Justifiable: Abortion | 80687 | 1 | 10 | 3.29 | 2.771 | | Justifiable: Divorce | 82514 | 1 | 10 | 4.63 | 3.079 | | Justifiable: Sex before marriage | 71790 | 1 | 10 | 4.69 | 3.349 | | Justifiable: Suicide | 82492 | 1 | 10 | 2.30 | 2.252 | | Justifiable: Euthanasia | 40904 | 1 | 10 | 3.37 | 2.988 | | Justifiable: For a man to beat his wife | 83683 | 1 | 10 | 2.08 | 2.032 | | Justifiable: Parents beating children | 83688 | 1 | 10 | 2.91 | 2.575 | | Justifiable: Violence against other people | 83652 | 1 | 10 | 1.99 | 1.912 | | Valid N (listwise) | 28759 |  |  |  |  | |

|  |  |  |
| --- | --- | --- |
| **KMO and Bartlett's Test** | | |
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .908 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 223306.332 |
| df | 105 |
| Sig. | .000 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Total Variance Explained** | | | | | | |
| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
| Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 5.806 | 38.709 | 38.709 | 5.806 | 38.709 | 38.709 |
| 2 | 2.702 | 18.012 | 56.721 | 2.702 | 18.012 | 56.721 |
| 3 | 1.206 | 8.043 | 64.764 | 1.206 | 8.043 | 64.764 |
| 4 | .732 | 4.879 | 69.643 |  |  |  |
| 5 | .637 | 4.247 | 73.890 |  |  |  |
| 6 | .529 | 3.527 | 77.417 |  |  |  |
| 7 | .466 | 3.108 | 80.525 |  |  |  |
| 8 | .459 | 3.063 | 83.588 |  |  |  |
| 9 | .419 | 2.794 | 86.382 |  |  |  |
| 10 | .404 | 2.691 | 89.073 |  |  |  |
| 11 | .377 | 2.512 | 91.585 |  |  |  |
| 12 | .338 | 2.254 | 93.840 |  |  |  |
| 13 | .315 | 2.100 | 95.940 |  |  |  |
| 14 | .313 | 2.085 | 98.025 |  |  |  |
| 15 | .296 | 1.975 | 100.000 |  |  |  |
| Extraction Method: Principal Component Analysis. | | | | | | |



|  |  |  |  |
| --- | --- | --- | --- |
| **Component Matrixa** | | | |
|  | Component | | |
| 1 | 2 | 3 |
| Justifiable: Suicide | .715 |  |  |
| Justifiable: Prostitution | .713 | -.304 |  |
| Justifiable: Someone accepting a bribe in the course of their duties | .694 | .409 |  |
| Justifiable: Stealing property | .686 | .432 |  |
| Justifiable: Violence against other people | .682 | .369 |  |
| Justifiable: Cheating on taxes if you have a chance | .664 | .375 |  |
| Justifiable: Abortion | .663 | -.486 |  |
| Justifiable: Euthanasia | .647 | -.383 |  |
| Justifiable: Homosexuality | .611 | -.543 |  |
| Justifiable: For a man to beat his wife | .603 | .440 | .432 |
| Justifiable: Avoiding a fare on public transport | .568 | .322 | -.456 |
| Justifiable: Claiming government benefits to which you are not entitled | .471 | .355 | -.464 |
| Justifiable: Sex before marriage | .556 | -.605 |  |
| Justifiable: Divorce | .552 | -.583 |  |
| Justifiable: Parents beating children | .418 | .397 | .592 |
| Extraction Method: Principal Component Analysis. | | | |
| a. 3 components extracted. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Pattern Matrixa** | | | |
|  | Component | | |
| 1 | 2 | 3 |
| Justifiable: Avoiding a fare on public transport | .826 |  |  |
| Justifiable: Claiming government benefits to which you are not entitled | .809 |  |  |
| Justifiable: Cheating on taxes if you have a chance | .708 |  |  |
| Justifiable: Stealing property | .684 |  |  |
| Justifiable: Someone accepting a bribe in the course of their duties | .650 |  |  |
| Justifiable: Sex before marriage |  | -.851 |  |
| Justifiable: Divorce |  | -.834 |  |
| Justifiable: Homosexuality |  | -.828 |  |
| Justifiable: Abortion |  | -.817 |  |
| Justifiable: Euthanasia |  | -.725 |  |
| Justifiable: Prostitution |  | -.687 |  |
| Justifiable: Suicide |  | -.540 | .335 |
| Justifiable: Parents beating children |  |  | .875 |
| Justifiable: For a man to beat his wife |  |  | .800 |
| Justifiable: Violence against other people |  |  | .664 |
| Extraction Method: Principal Component Analysis.  Rotation Method: Oblimin with Kaiser Normalization. | | | |
| a. Rotation converged in 8 iterations. | | | |

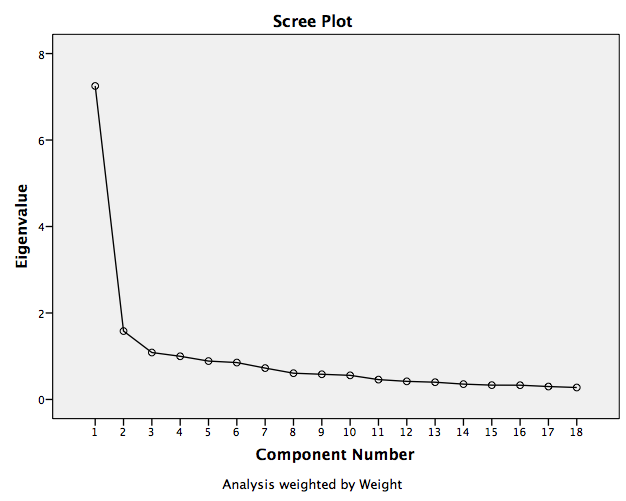
|  |  |  |  |
| --- | --- | --- | --- |
| **Rotated Component Matrixa** | | | |
|  | Component | | |
| 1 | 2 | 3 |
| Justifiable: Sex before marriage | .820 |  |  |
| Justifiable: Homosexuality | .811 |  |  |
| Justifiable: Abortion | .806 |  |  |
| Justifiable: Divorce | .803 |  |  |
| Justifiable: Euthanasia | .722 |  |  |
| Justifiable: Prostitution | .705 |  |  |
| Justifiable: Suicide | .574 |  | .405 |
| Justifiable: Avoiding a fare on public transport |  | .783 |  |
| Justifiable: Claiming government benefits to which you are not entitled |  | .749 |  |
| Justifiable: Cheating on taxes if you have a chance |  | .725 |  |
| Justifiable: Stealing property |  | .719 | .384 |
| Justifiable: Someone accepting a bribe in the course of their duties |  | .694 | .399 |
| Justifiable: Parents beating children |  |  | .824 |
| Justifiable: For a man to beat his wife |  |  | .806 |
| Justifiable: Violence against other people |  | .390 | .707 |
| Extraction Method: Principal Component Analysis.  Rotation Method: Varimax with Kaiser Normalization. | | | |
| a. Rotation converged in 4 iterations. | | | |

**ÖRNEK 2**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Descriptive Statistics** | | | | | |
|  | N | Minimum | Maximum | Mean | Std. Deviation |
| Confidence: The Churches | 82229 | 1 | 4 | 2.16 | 1.017 |
| Confidence: The armed forces | 79760 | 1 | 4 | 2.17 | .918 |
| Confidence: The press | 82681 | 1 | 4 | 2.61 | .867 |
| Confidence: Television | 83379 | 1 | 4 | 2.50 | .877 |
| Confidence: Labour Unions | 73565 | 1 | 4 | 2.72 | .891 |
| Confidence: The police | 83234 | 1 | 4 | 2.38 | .937 |
| Confidence: The courts | 82098 | 1 | 4 | 2.41 | .940 |
| Confidence: The government (in your nation’s capital) | 82355 | 1 | 4 | 2.56 | .956 |
| Confidence: Political Parties | 77983 | 1 | 4 | 2.92 | .883 |
| Confidence: Parliament | 81167 | 1 | 4 | 2.72 | .937 |
| Confidence: The Civil service | 80140 | 1 | 4 | 2.57 | .890 |
| Confidence: Universities | 80440 | 1 | 4 | 2.14 | .853 |
| Confidence: Major Companies | 79470 | 1 | 4 | 2.49 | .871 |
| Confidence: Banks | 81455 | 1 | 4 | 2.42 | .928 |
| Confidence: Environmental organizations | 78383 | 1 | 4 | 2.38 | .876 |
| Confidence: Women's organizations | 76570 | 1 | 4 | 2.39 | .896 |
| Confidence: Charitable or humanitarian organizations | 79044 | 1 | 4 | 2.32 | .892 |
| Confidence: The European Union | 15126 | 1 | 4 | 2.68 | .814 |
| Valid N (listwise) | 11721 |  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **KMO and Bartlett's Test** | | |
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .926 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 108866.770 |
| df | 153 |
| Sig. | .000 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Total Variance Explained** | | | | | | |
| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
| Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 7.251 | 40.282 | 40.282 | 7.251 | 40.282 | 40.282 |
| 2 | 1.582 | 8.789 | 49.071 | 1.582 | 8.789 | 49.071 |
| 3 | 1.086 | 6.031 | 55.102 | 1.086 | 6.031 | 55.102 |
| 4 | .999 | 5.549 | 60.650 |  |  |  |
| 5 | .888 | 4.932 | 65.583 |  |  |  |
| 6 | .854 | 4.742 | 70.325 |  |  |  |
| 7 | .726 | 4.032 | 74.356 |  |  |  |
| 8 | .607 | 3.374 | 77.731 |  |  |  |
| 9 | .583 | 3.237 | 80.968 |  |  |  |
| 10 | .558 | 3.098 | 84.066 |  |  |  |
| 11 | .459 | 2.551 | 86.617 |  |  |  |
| 12 | .419 | 2.326 | 88.943 |  |  |  |
| 13 | .399 | 2.216 | 91.159 |  |  |  |
| 14 | .355 | 1.972 | 93.131 |  |  |  |
| 15 | .331 | 1.840 | 94.971 |  |  |  |
| 16 | .330 | 1.833 | 96.804 |  |  |  |
| 17 | .299 | 1.661 | 98.464 |  |  |  |
| 18 | .276 | 1.536 | 100.000 |  |  |  |
| Extraction Method: Principal Component Analysis. | | | | | | |



|  |  |  |  |
| --- | --- | --- | --- |
| **Rotated Component Matrixa** | | | |
|  | Component | | |
| 1 | 2 | 3 |
| Confidence: The Churches |  |  | .562 |
| Confidence: The armed forces | .345 |  | .526 |
| Confidence: The press | .312 |  | .740 |
| Confidence: Television | .303 |  | .747 |
| Confidence: Labour Unions | .424 |  | .430 |
| Confidence: The police | .614 |  | .301 |
| Confidence: The courts | .676 |  |  |
| Confidence: The government (in your nation’s capital) | .778 |  |  |
| Confidence: Political Parties | .758 |  |  |
| Confidence: Parliament | .800 |  |  |
| Confidence: The Civil service | .638 | .371 |  |
| Confidence: Universities |  | .586 |  |
| Confidence: Major Companies |  | .576 |  |
| Confidence: Banks |  | .534 |  |
| Confidence: Environmental organizations |  | .787 |  |
| Confidence: Women's organizations |  | .784 |  |
| Confidence: Charitable or humanitarian organizations |  | .771 |  |
| Confidence: The European Union |  | .501 |  |
| Extraction Method: Principal Component Analysis.  Rotation Method: Varimax with Kaiser Normalization. | | | |
| a. Rotation converged in 5 iterations. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Pattern Matrixa** | | | |
|  | Component | | |
| 1 | 2 | 3 |
| Confidence: The Churches |  |  | .603 |
| Confidence: The armed forces |  |  | .501 |
| Confidence: The press |  |  | .750 |
| Confidence: Television |  |  | .764 |
| Confidence: Labour Unions | .330 |  | .355 |
| Confidence: The police | .601 |  |  |
| Confidence: The courts | .670 |  |  |
| Confidence: The government (in your nation’s capital) | .812 |  |  |
| Confidence: Political Parties | .798 |  |  |
| Confidence: Parliament | .831 |  |  |
| Confidence: The Civil service | .606 |  |  |
| Confidence: Universities |  | .572 |  |
| Confidence: Major Companies |  | .544 |  |
| Confidence: Banks |  | .495 |  |
| Confidence: Environmental organizations |  | .842 |  |
| Confidence: Women's organizations |  | .845 |  |
| Confidence: Charitable or humanitarian organizations |  | .834 |  |
| Confidence: The European Union |  | .497 |  |
| Extraction Method: Principal Component Analysis.  Rotation Method: Oblimin with Kaiser Normalization. | | | |
| a. Rotation converged in 6 iterations. | | | |