**SUPLEMENTARY MATERIAL**

Table S1: Survey Format and Vehicle Capacities.

**TRAVEL PREFERENCE SURVEYS**.

| |
|---|
| Excuse me (Mr, Miss, young man), we are working on a survey of public transport users, for study purposes.<br>Could you help us answer some questions? |

**I. GENERAL DATA**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Interview point | | Code Zone | | Survey date | | Day of the week | |
| Name of interviewer | | | | | | Survey time: (24 Hrs format) | |

**II. INFORMATION ON PUBLIC TRANSPORTATION**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | **¿ WHERE IT COME FROM?** | | | 7 | **PROBLEMS OF THE PUBLIC TRANSPORTATION SERVICE** | | | |
| | District Name | | | | Compliant with the service | | 1 | |
| | Urbanization and/or sector | | | | High price | | 2 | |
| | Reference point | | | | Unsafety | | 3 | |
| | **¿ WHERE IT GOES?** | | | | Poor condition of the vehicles | | 4 | |
| | District Name | | | | Abuse by driver or collector | | 5 | |
| | Urbanization and/or sector | | | | High delay time | | 6 | |
| | Reference point | | | | High waiting time | | 7 | |
| 2 | **HOW LONG DOES YOUR TRIP TAKE?** | | min | 8 | **YOU COULD DO WITHOUT THE PUBLIC TRANSPORTATION SERVICE** | | Yes | |
| 3 | **HOW MUCH DOES THE TICKET COST YOU (Nuevos soles)** | | S/. | | | | Not | |
| 4 | **HOW OFTEN DO YOU USE PUBLIC TRANSPORTATION?** | | | 9 | **WHAT MODES OF TRANSPORTATION WOULD YOU USE IF PUBLIC TRANSPORTATION DIDN'T EXIST?** | | | |
| | Diary | | 1 | | Mototaxis | | 1 | |
| | 2 times per week | | 2 | | Collective car | | 2 | |
| | 3 times a week | | 3 | | Private Car | | 3 | |
| | Biweekly | | 4 | | Hike | | 4 | |
| | Monthly | | 5 | | Others | | 5 | |
| | Occasional | | 6 | 10 | **HOW OLD ARE YOU?** | | | |
| 5 | **WHAT IS YOUR REASON FOR TRAVEL?** | | | | Less than 15 years | | 1 | |
| | Job | | 1 | | 15 to 24 years | | 2 | |
| | Study | | 2 | | 25 to 34 years | | 3 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Shopping | | 3 | | 35 to 44 years | | 4 |
| | Health | | 4 | | 45 to 54 years | | 5 |
| | To home | | 5 | | | | |
| | Tourism | | 6 | | 55 to 64 years | | 6 |
| | Others (specify) | | 7 | | 65 to more years | | 7 |
| 6 | **HOW WOULD YOU RATE THE PUBLIC TRANSPORTATION SERVICE?** | | | 11 | **FAMILY INCOME RANGE** | | |
| | Well | | 1 | | From 900 to 1200 soles | | 1 |
| | Regular | | 2 | | From 1200 to 2000 soles | | 2 |
| | Bad | | 3 | | From 2000 to 3000 soles | | 3 |
| | Very bad | | 4 | | From 3000 soles to more | | 4 |

Origin and destination matrix Calibrated with population growth data, in the upper and left part, the transit areas are identified and in the central part the number of trips.

Table S2: Origin and destination matrix .

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 27 | 28 | 29 | 30 | 31 | 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 0 | 3592 | 3592 | 0 | 5388 | 0 | 0 | 0 | 0 | 3592 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1796 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2** | 0 | 3617 | 2170 | 0 | 2894 | 2170 | 0 | 0 | 1447 | 1447 | 723 | 2170 | 2170 | 0 | 0 | 0 | 362 | 0 | 0 | 0 | 0 | 0 | 723 | 1447 | 723 | 0 | 0 | 723 |
| **3** | 4450 | 5340 | 1780 | 0 | 1780 | 0 | 890 | 0 | 0 | 1780 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **4** | 0 | 0 | 0 | 646 | 0 | 0 | 0 | 0 | 646 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **5** | 2018 | 1615 | 404 | 0 | 404 | 404 | 0 | 404 | 404 | 807 | 807 | 807 | 1615 | 0 | 1211 | 0 | 0 | 0 | 0 | 0 | 404 | 0 | 404 | 807 | 0 | 404 | 202 | 0 |
| **6** | 0 | 1927 | 0 | 0 | 1445 | 0 | 0 | 0 | 0 | 0 | 1927 | 0 | 0 | 0 | 0 | 0 | 241 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **7** | 0 | 5297 | 0 | 0 | 8828 | 0 | 0 | 0 | 441 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 883 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1766 | 0 | 0 | 0 |
| **8** | 0 | 4252 | 0 | 0 | 0 | 0 | 0 | 0 | 1417 | 0 | 472 | 0 | 1890 | 0 | 472 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **9** | 0 | 9856 | 0 | 0 | 7884 | 0 | 0 | 0 | 1971 | 0 | 0 | 0 | 1971 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1971 | 0 | 0 | 0 | 0 | 0 | 0 |
| **10** | 0 | 12698 | 0 | 0 | 6349 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **11** | 0 | 4320 | 0 | 0 | 4320 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **12** | 0 | 1959 | 979 | 0 | 0 | 0 | 0 | 0 | 979 | 0 | 0 | 0 | 979 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 979 | 0 | 0 | 0 | 0 |
| **13** | 987 | 1973 | 3946 | 0 | 3946 | 0 | 1973 | 0 | 0 | 1973 | 987 | 0 | 3946 | 0 | 0 | 0 | 1973 | 0 | 0 | 0 | 0 | 0 | 1973 | 987 | 0 | 0 | 987 | 0 |
| **14** | 1670 | 0 | 0 | 0 | 3341 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **15** | 0 | 1056 | 528 | 0 | 528 | 0 | 0 | 0 | 1585 | 0 | 1056 | 0 | 0 | 0 | 528 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1056 | 1056 | 0 | 0 | 0 | 0 |
| **16** | 0 | 0 | 0 | 0 | 655 | 1309 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **17** | 0 | 3333 | 0 | 0 | 3333 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9166 | 1667 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **18** | 0 | 888 | 0 | 0 | 888 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7105 | 5329 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **19** | 0 | 6283 | 0 | 0 | 2856 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2285 | 0 | 571 | 571 | 0 | 0 | 0 | 571 | 0 | 0 | 1142 | 0 |
| **20** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2672 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1782 | 0 | 0 | 0 | 0 | 0 | 0 |
| **21** | 0 | 825 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 825 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 825 |
| **22** | 0 | 2466 | 0 | 0 | 822 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **23** | 0 | 791 | 0 | 0 | 2373 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 791 | 0 | 0 | 0 | 0 | 791 | 0 | 0 | 0 | 0 | 791 |
| **24** | 0 | 2522 | 0 | 0 | 4203 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **25** | 0 | 1692 | 0 | 0 | 1692 | 0 | 0 | 0 | 846 | 0 | 846 | 0 | 0 | 0 | 0 | 0 | 0 | 846 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2538 |
| **26** | 0 | 7789 | 0 | 0 | 3116 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 779 | 0 | 0 | 0 | 0 | 779 | 0 | 0 | 0 | 0 | 0 | 779 | 0 | 0 | 0 | 0 |
| **27** | 0 | 0 | 0 | 0 | 4722 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **28** | 0 | 0 | 0 | 0 | 7284 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **29** | 0 | 2073 | 0 | 0 | 4146 | 0 | 0 | 0 | 0 | 0 | 691 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 691 | 691 | 0 |
| **30** | 0 | 2133 | 0 | 0 | 1067 | 0 | 0 | 0 | 0 | 0 | 1067 | 0 | 0 | 0 | 0 | 0 | 1067 | 0 | 0 | 1067 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1067 |
| **31** | 767 | 3068 | 0 | 0 | 4602 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 767 | 2301 | 0 | 767 | 0 | 0 | 0 | 0 | 0 | 0 | 767 | 0 | 0 | 767 | 0 | 767 |
| **32** | 0 | 1268 | 0 | 0 | 5073 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 634 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1902 | 1902 | 0 |

Below is shown the demand of users of the system, frequencies and number of buses.

Table S3: Green Route:

| SENSE | N° | STOPPING AREAS | GOES UP | LOW | PASSENGERS ON BOARD |
|---|---|---|---|---|---|
| RETURN | 1 | 4 | 323 | 162 | 162 |
| | 2 | 15,16 | 1875 | 0 | 2036 |
| | 3 | 9, 8 | 4138 | 558 | 5616 |
| | 4 | 12,13 | 4922 | 1930 | 8608 |
| | 5 | 1, 5, 6 | 3264 | 5134 | 6738 |
| | 6 | 3,7 | 445 | 3233 | 3950 |
| | 8 | 10 | 0 | 2038 | 1912 |
| | 9 | 11 | 0 | 1912 | 0 |
| | 10 | 14 | 0 | 0 | 0 |
| | 11 | 30 | 0 | 0 | 0 |

| SPEED= | 20 KPH | LENGTH | FLOAT | FREQUENCY |
|---|---|---|---|---|
| REGULAR URBAN SERVICE | | 5.57 | 15 | 4.07 |
| SERVICE CENTER | | 3 | 12 | 5.20 |
| CENTER-AIRPORT SERVICE | | 3.15 | 7 | 8.87 |
| EAST-WEST DIRECTION | | | 33 | |

Table S4: Orange Route:

| SENSE | N° | STOPPING AREAS | GOES UP | LOW | PASSENGERS ON BOARD |
|---|---|---|---|---|---|
| RETURN | 1 | 4 | 323 | 162 | 162 |
| | 2 | 15,16 | 1187 | 0 | 1348 |
| | 3 | 9, 8 | 2628 | 690 | 3287 |
| | 4 | 12,13 | 2713 | 0 | 6000 |
| | 5 | 1, 5, 6 | 2301 | 3022 | 5278 |
| | 5 | 2 | 0 | 0 | 5278 |
| | 8 | 3,7 | 445 | 2972 | 2751 |
| | 9 | 10 | 0 | 2038 | 713 |
| | 10 | 11 | 0 | 713 | 0 |
| | 11 | 14 | 0 | 0 | 0 |
| | 12 | 30 | 0 | 0 | 0 |

| SPEED= | 20 KPH | LENGTH | FLOAT | FREQUENCY |
|---|---|---|---|---|
| REGULAR URBAN SERVICE | | 6.4 | 6 | 10.66 |
| SERVICE CENTER | | 3.4 | 10 | 5.84 |
| CENTER-AIRPORT SERVICE | | 3.15 | 9 | 6.64 |
| EAST-WEST DIRECTION | | | 25 | |

Table S5: Aquamarine Route:

| SENSE | N° | STOPPING AREAS | GOES UP | LOW | PASSENGERS ON BOARD |
|---|---|---|---|---|---|
| RETURN | 1 | 4 | 323 | 162 | 162 |
| | 2 | 15,16 | 2931 | 0 | 3093 |
| | 3 | 9, 8 | 8389 | 558 | 10924 |
| | 4 | 12,13 | 7624 | 1930 | 16618 |
| | 5 | 1, 5, 6 | 3264 | 7347 | 12536 |
| | 6 | 2 | 0 | 5308 | 7228 |
| | 6 | 3,7 | 445 | 3722 | 9258 |
| | 8 | 10 | 0 | 2038 | 7220 |
| | 9 | 11 | 0 | 1912 | 5308 |
| | 11 | 30 | 0 | 0 | 5308 |

| SPEED= | 20 KPH | LENGTH | FLOAT | FREQUENCY |
|---|---|---|---|---|
| REGULAR URBAN SERVICE | | 6.4 | 19 | 3.21 |
| SERVICE CENTER | | 3.4 | 28 | 2.11 |
| CENTER-AIRPORT SERVICE | | 3.4 | 21 | 2.79 |
| EAST-WEST DIRECTION | | | 69 | |

Table S6: Dwelling Route:

| SENSE | N° | STOPPING AREAS | GOES UP | LOW | PASSENGERS ON BOARD |
|---|---|---|---|---|---|
| RETURN | 1 | 4 | 0 | 0 | 0 |
| | 2 | 15, 16 | 2113 | 0 | 2113 |
| | 3 | 9, 8 | 14107 | 792 | 15428 |
| | 4 | 12,13 | 2713 | 0 | 18141 |
| | 5 | 1, 5, 6 | 3300 | 0 | 21440 |
| | 5 | 2 | 0 | 17137 | 4304 |
| | 8 | 3,7 | 445 | 1998 | 2751 |
| | 9 | 10 | 0 | 2038 | 713 |
| | 10 | 11 | 0 | 713 | 0 |
| | 11 | 14 | 0 | 0 | 0 |
| | 12 | 30 | 0 | 0 | 0 |

| SPEED= | 20 KPH | LENGTH | FLOAT | FREQUENCY |
|---|---|---|---|---|
| REGULAR URBAN SERVICE | | 6.4 | 26 | 2.27 |
| SERVICE CENTER | | 3.4 | 31 | 1.93 |
| CENTER-AIRPORT SERVICE | | 0.17 | 37 | 1.63 |
| EAST-WEST DIRECTION | | | 94 | |

Table S7: Pink Route:

| SENSE | N° | STOPPING AREAS | GOES UP | LOW | PASSENGERS ON BOARD |
|---|---|---|---|---|---|
| RETURN | 1 | 26 | 0.00 | 0.00 | 0 |
| | 2 | 17 | 0.00 | 0.00 | 0 |
| | 3 | 18 | 0.00 | 0.00 | 0 |
| | 4 | 25 | 0.00 | 0.00 | 0 |
| | 5 | 4 | 0.00 | 0.00 | 0 |
| | 6 | 19 | 0.00 | 0.00 | 0 |
| | 7 | 29 | 0.00 | 0.00 | 0 |
| | 8 | 28 | 0.00 | 0.00 | 0 |
| | 9 | 22 | 3288.00 | 0.00 | 3288 |
| | 10 | 21 | 824.89 | 0.00 | 4113 |
| | 11 | 20 | 2672.40 | 0.00 | 6785 |
| | 12 | 23 | 45565.05 | 0.00 | 52350 |
| | 13 | 4 | 0.00 | 0.00 | 52350 |
| | 14 | 15,16 | 0.00 | 0.00 | 52350 |
| | 15 | 9, 8 | 0.00 | 846.00 | 51504 |
| | 16 | 13 | 0.00 | 778.94 | 50725 |
| | 17 | 5 | 0.00 | 28357.91 | 22367 |
| | 18 | 1 | 0.00 | 0.00 | 22367 |
| | 19 | 2 | 0.00 | 18158.16 | 4209 |
| | 20 | 3 | 0.00 | 0.00 | 4209 |
| | 21 | 10 | 0.00 | 0.00 | 4209 |
| | 22 | 11 | 0.00 | 4209.32 | 0 |
| | 23 | 14 | 0.00 | 0.00 | 0 |
| | 24 | 30 | 0.00 | 0.00 | 0 |

| SPEED= | 20 KPH | LENGTH | FLOAT | FREQUENCY |
|---|---|---|---|---|
| AMARILIS-ESPERANZA URB | | 4.736 | 90 | 0.67 |
| SERVICE CENTER | | 2.45 | 88 | 0.68 |
| EAST-WEST DIRECTION | | | 178 | |

Table S8: Trunk Route:

| SENSE | N° | STOPPING AREAS | GOES UP | LOW | PASSENGERS ON BOARD |
|---|---|---|---|---|---|
| RETURN | | | | | |
| | 1.00 | 21 | 1650 | 0 | 1650 |
| | 2.00 | 23 | 2373 | 0 | 4023 |
| | 3.00 | 20 | 0 | 0 | 4023 |
| | 4.00 | 27 | 0 | 791 | 3232 |
| | 5.00 | 28 | 0 | 0 | 3232 |
| | 6.00 | 19 | 2285 | 1616 | 3901 |
| | 7.00 | 24 | 0 | 0 | 3901 |
| | 8.00 | 25,18 | 2538 | 1142 | 5296 |
| | 9.00 | 26,17 | 0 | 0 | 5296 |
| | 10.00 | 31 | 0 | 1142 | 4154 |
| | 11.00 | 32 | 0 | 4154 | 0 |

| SPEED= | 20 KPH | LENGTH | FLOAT | FREQUENCY |
|---|---|---|---|---|
| SERVICE CENTER | | 9.37 | 9 | 6.62 |
| SERVICE CENTER- ESPERAN | | 6.77 | 9 | 6.62 |
| EAST-WEST DIRECTION | | | 18 | |

Table S9: Cherry Route:

| SENSE | N° | STOPPING AREAS | GOES UP | LOW | PASSENGERS ON BOARD |
|---|---|---|---|---|---|
| RETURN | 1.00 | 30 | 2978 | 0.00 | 2978 |
| | 2.00 | 32 | 951 | 1790.04 | 2140 |
| | 3.00 | 31 | 0 | 2139.54 | 0 |

| SPEED= | 20 KPH | LENGTH | FLOAT | FREQUENCY |
|---|---|---|---|---|
| **REGULAR URBAN SERVICE** | | 3.62 | 5 | 11.76 |
| **EAST-WEST DIRECTION** | | | 5 | |