Assessment of EV Shuttle Services Adoption in Quetta: Traffic, Economic, and Policy Implications

Submitted To:

Balochistan Public Private Partnership Authority (BPPPA)

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Executive Summary

This report highlights the economic and operational realities of rickshaw drivers in Quetta city, alongside the perceptions of commuters regarding the potential introduction of electric (EV) rickshaws into the city's mobility system. The findings confirm both the urgent need and the strong public support for this transition, making it a highly feasible and timely intervention for Quetta's urban transport challenges.

Rickshaws play a critical role in Quetta's mobility system, serving a wide and diverse group of daily commuters while also providing livelihoods for thousands of drivers. Survey results show high and consistent demand, with most drivers completing 10–15 trips per day across morning-to-evening peaks, reflecting the indispensability of rickshaw services for intra-city mobility. Despite this steady demand, most drivers earn only PKR 1000–2000 per day, translating to PKR 60,000–80,000 per month, often insufficient to sustain their households. This economic vulnerability explains drivers' hesitation to invest in EV technology without institutional support.

On the other hand, the commuting public strongly supports EV adoption, with most respondents recognizing its benefits in reducing both noise and environmental pollution. Importantly, many commuters expressed willingness to tolerate a moderate fare adjustment if it facilitates a cleaner, more efficient, and sustainable rickshaw system. This alignment between commuter acceptance and environmental imperatives provides a rare policy window for immediate action.

While some drivers voiced concerns about the cost of adoption and the lack of charging infrastructure, these challenges are solvable through targeted subsidies, microloan/lease models, and the establishment of charging stations along high-demand corridors. Such measures would allow drivers to upgrade without financial strain, while also ensuring smooth and efficient operations.

The survey findings further indicate that integration of EV Shuttle Services within Quetta's existing transport system is critical. Given that the city already struggles with congestion and lacks the capacity for a large new fleet of transport vehicles, EV Shuttle Services should be introduced as a complementary upgrade to the current mobility landscape rather than a parallel system. This would ensure that the transition supports traffic efficiency while improving environmental quality.

In conclusion, the survey results make it clear that the public is ready for EV Shuttle Services , while drivers are willing to participate if provided financial and infrastructural support. The introduction of EV Shuttle Services in Quetta thus represents not only an environmental necessity but also an opportunity to modernize mobility, strengthen sustainability, and enhance equitable access to transport. With structured policies, subsidies, and infrastructure planning, EV Shuttle Services can transform Quetta's urban mobility system into one that is cleaner, more efficient, and socially inclusive.

Contents

Methodology Of the Survey

The study was conducted using a *Survey-based Approach.* A quantitative research method was used to extensively study the rickshaw drivers and the commuters within Quetta city.

- **Sample Size**

A total of around 641 drivers were surveyed across the key stands, main roads, and high traffic corridors. Roughly all the city is covered, stretching from Jinnah town, Airport Road, BUITEMS, to Satellite town, Spini road, and Zarghoon road.

A total of 639 commuters were surveyed, belonging to various occupations and segments of the city, including students, informal workers, office workers, and laborers.

- **Survey Instruments**

The *structured questionnaire* technique is used to collect the responses from both rikshaw drivers and commuters. It is a quantitative research method precisely done, keeping a set of standardized questions that set the tone and specific language for the respondents, giving a comprehensive and detailed insight into the operational system of the rikshaw transport system and a social reality check. The sections include driver operations ranging from trips per day, passengers, average income, working days, peak hours, other income sources, and their willingness towards the adoption of EV technology. The same followed for the commuters, highlighting their preferences, concerns, and willingness to accept EV technology.

- **Survey Questionnaire Sample**

The survey questionnaire for Rickshaw drivers and riders collects detailed information across various sections. It begins with basic details such as date, day, location, enumerator ID, driver ID, age, gender, years driving, and education level. The driving section includes questions about the average trips per day, average passenger fare per trip, average gross income per day, number of working days per week, peak hours, and whether they have other income sources or monthly amounts, as well as which routes and fare areas are most used by passengers. It also assesses their worry levels about government EV projects and their willingness to switch to EV Shuttle Services , including preferred conditions and monthly income needed to maintain household standards. The commuter section gathers data on age, gender, typical trip origin and destination, trip frequency

per week, feelings about switching to small EVs, willingness to pay more for EVs, and concerns about EV safety, charging delays, price, and other factors.

Survey Questionnaire for Rickshaw Drivers and Riders

A. Rickshaw driver (short questionnaire)

DATE: _____ DAY: _____LOCATION: _____

ENUMERATOR ID: _____

DRIVER ID _____

AGE _____

GENDER _____

YEARS DRIVING _____

EDUCATION LEVEL _____

1. **Average Trips Per Day** | 05 -10 | 10 -15 | 15 -20 | 20 -25 |
2. **Average Passenger Per Trip** | 01 | 02 | 03 | ≤04 |
3. **Average Gross Income Per Day (7-Days) :** _____
4. **Number of Working Days Per Week :** | 04 | 05 | 06 | 07 |
5. **What Are Your Peak Hours? :** _____
6. **Do You Have Other Income Sources? Y/N.** | Yes | No |

If yes, list and monthly amount. : _____

7. **Which routes/areas are most commonly used by your passengers?**

_____

8. **How worried are you that the government EV project will reduce your income?**

01 = Not Worried	02=Slightly Worried	03=Neutral	04 = Worried	05 = Very Worried

9. **If EV rickshaws replace conventional rickshaws on your routes, what would you do? (choose)**
   - **Switch to drive EV (if trained / transferred)**
   - **Seek other driving work (taxis, buses)**
   - **Do other non-transport work**
   - **Stop working (retire)**
   - **Other (specify)**
10. **What monthly income (PKR) would you need to maintain current household standard of living?**

_____

B. COMMUTER

1. **Age:_____ Gender:_____, Occupation:_____**
2. **Typical trip: Origin_____Destination_____.**
3. **Trip frequency per week._____ Trip fare (PKR)_____**
3. **How do you feel about switching to small EVs?**

01 = strongly opposed	02=Slightly Opposed	03=Neutral	04 = Supportive	05 = Very Enthusiastic

4. **Would you pay more for EV** | Yes | | No | **how much more (PKR)? _____**
5. **Concerns about EVs (safety, charging delays, price,**

SAFETY	CHARGING	DELAYS	PRICE	OTHERS

- **Data Collection and Response Rate**

Field surveys were conducted over a four-day period, spanning Tuesday, Wednesday, Thursday, and Saturday, across multiple locations within the Quetta central business district. These locations included main markets, bus/rickshaw stands, educational institutes, and residential areas to ensure comprehensive coverage. To address gender-based questions effectively, the survey team comprised four enumerators, with two being female, who specifically recorded responses from female commuters. The methodology integrated interviews alongside quantitative data collection to capture qualitative insights into EV adoption. Of the 641 Rickshaw drivers approached, 639 provided valid responses, yielding a response rate of 99.7%. Similarly, all 639 commuters approached submitted valid responses, achieving a 100% response rate.

- **Data Presentation**

All the data is precisely evaluated in the excel sheets and further presented in the forms of tables and graphs with detailed description for further clarity and clarification of the data.

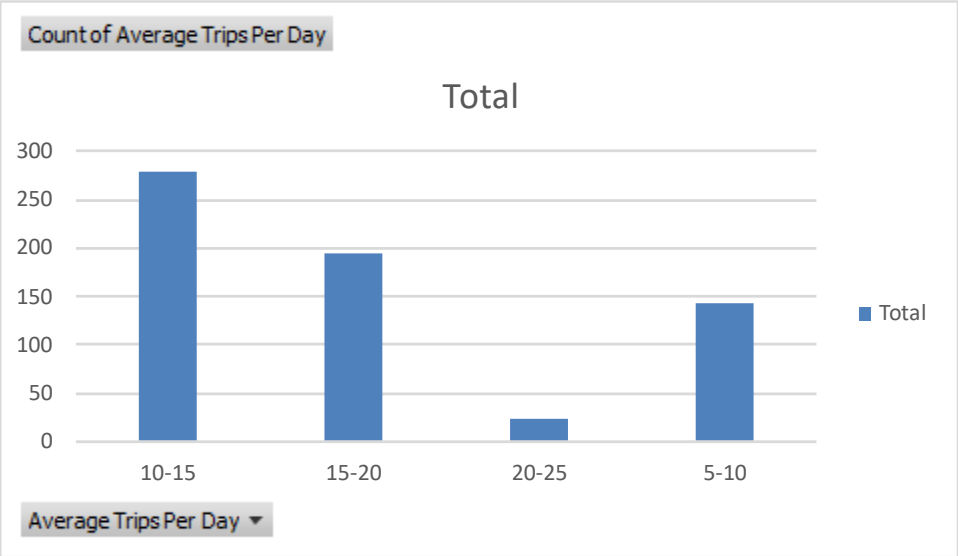
This methodology ensures that both aspects, from drivers to commuters, are presented in a structured manner. Both operational patterns of drivers and mobility needs of commuters are covered, offering a reliable basis for analyzing the potential of EV Shuttle Services adoption in Quetta CBD.

Current Scenario

Drivers' Economic and Operational Insights

This section outlines the survey-based findings concerning driver practices and their perceptions of electric vehicle (EV) technology. For comprehensive understanding, the results are presented through graphical illustrations and corresponding data tables, supplemented with descriptive analysis to enhance clarity and interpretation.

- **Average trips per Day**



Row Labels	Count of Average Trips Per Day
10-15	280
15-20	194
20-25	24
5-10	143
Grand Total	**641**

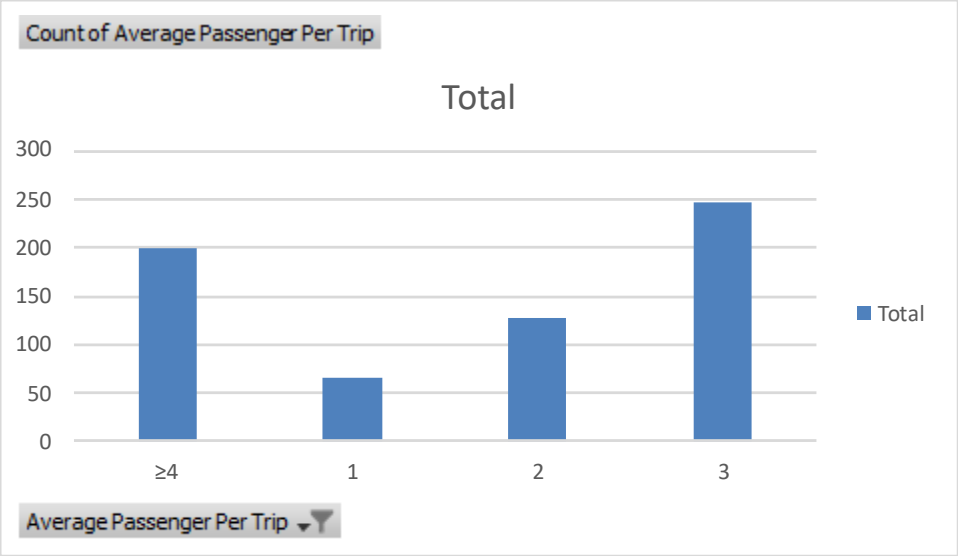
The average number of trips completed in a day is a critical metric for understanding not only the workload of rickshaw drivers but also their income potential and the demand patterns that define Quetta's mobility system. The data shows a clear concentration in trip frequency:

- Most drivers (280) fall within the 10–15 trips per day range. This indicates a steady and sustainable demand throughout the day, allowing drivers to balance working hours with passenger availability.
- A significant group (194 drivers) manage to complete 15–20 trips daily, reflecting higher productivity but also greater exposure to fatigue and vehicle wear.
- Another 143 drivers average 5–10 trips per day, often due to limited working hours, restricted operating areas, or competition within congested zones.

- A very small minority (24 drivers) achieve 20–25 trips daily, representing the upper limit of operational capacity. These drivers are typically working extended hours, covering long distances, or benefiting from consistent passenger demand in high-density corridors.

This distribution highlights that while demand for rickshaw transport is consistently high, most drivers operate within a moderate range of 10–15 trips, which forms the backbone of daily urban mobility in Quetta. The smaller number of drivers completing higher trip volumes points to both the intensity of demand in certain corridors and the physical limitations of overextended operations. Collectively, these patterns underline the central role of rickshaws in sustaining mobility, while also stressing the importance of policies that can improve efficiency, reduce driver fatigue, and enhance income stability—objectives that can be directly supported by the adoption of EV Shuttle Services .

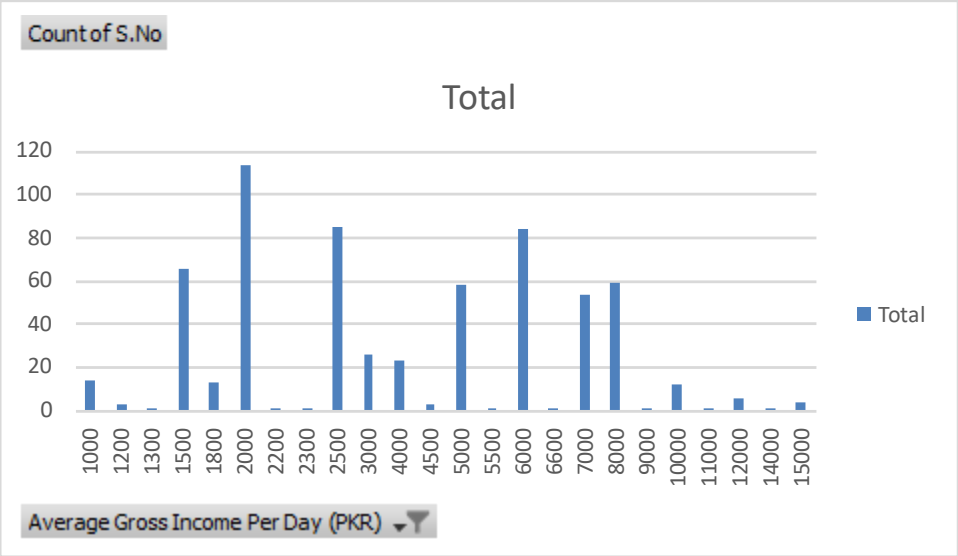
- **Average Passengers per Day**



Row Labels	Count of Average Passenger Per Trip
≥4	199
1	65
2	128
3	247
Grand Total	**639**

Analyzing vehicle utilization and travel demand, the data shows that rickshaws play a vital role in Quetta's daily passenger flow. The largest group of drivers, about 250, reported carrying an average of three passengers per day, indicating a dominant operational trend. Another 199 drivers carried four or more passengers daily, while 128 drivers averaged two, and 65 drivers managed only one passenger per day. This distribution highlights the rickshaw's central role in meeting urban mobility needs, with most operations clustered around 2–4 passengers daily.

- **Average Income per Day**

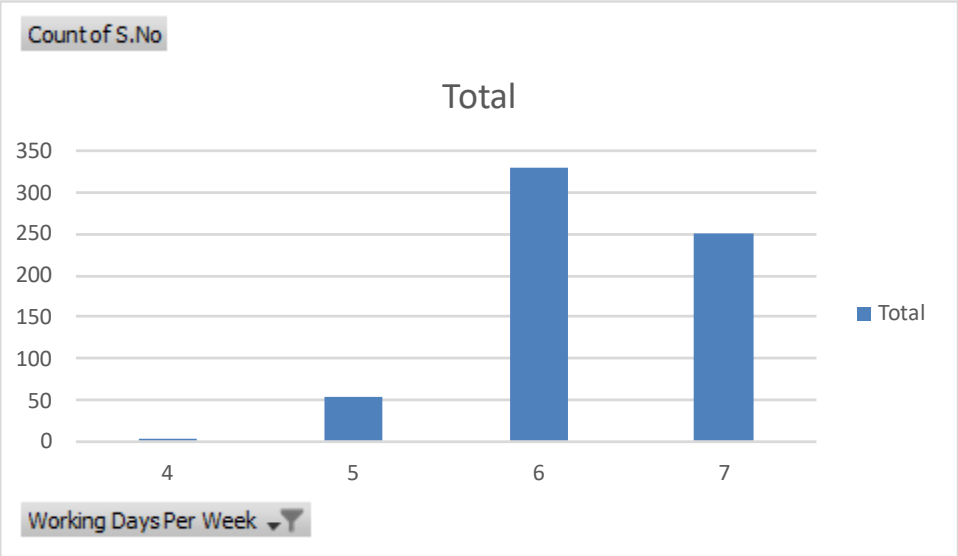


Row Labels	Count of S.No
1000	14
1200	3
1300	1
1500	66
1800	13
2000	114
2200	1
2300	1
2500	85
3000	26

4000	23
4500	3
5000	58
5500	1
6000	84
6600	1
7000	54
8000	59
9000	1
10000	12
11000	1
12000	6
14000	1
15000	4
Grand Total	**632**

This section is significant in assessing the economic sustainability of rickshaw operations, as it reflects the financial resilience of drivers and informs whether a transition to new technologies is viable for their livelihoods. The data reveals that a large segment of drivers (114) earn an average daily income of PKR 2,000, while higher-earning groups remain comparatively small, with 85 drivers earning PKR 2,500, 58 earning PKR 5,000, 84 earning PKR 6,000, 54 earning PKR 7,000, and 59 earning PKR 8,000. Only four drivers reported daily earnings of PKR 15,000. Conversely, a considerable number of drivers fall in the lowest tier, with 14 earning PKR 1,000 and 66 earning PKR 1,500 per day. These income levels closely mirror passenger flow patterns and highlight the financial vulnerability of most drivers, underscoring the need for targeted support measures to ensure that any transition to EV Shuttle Services is both practical and sustainable.

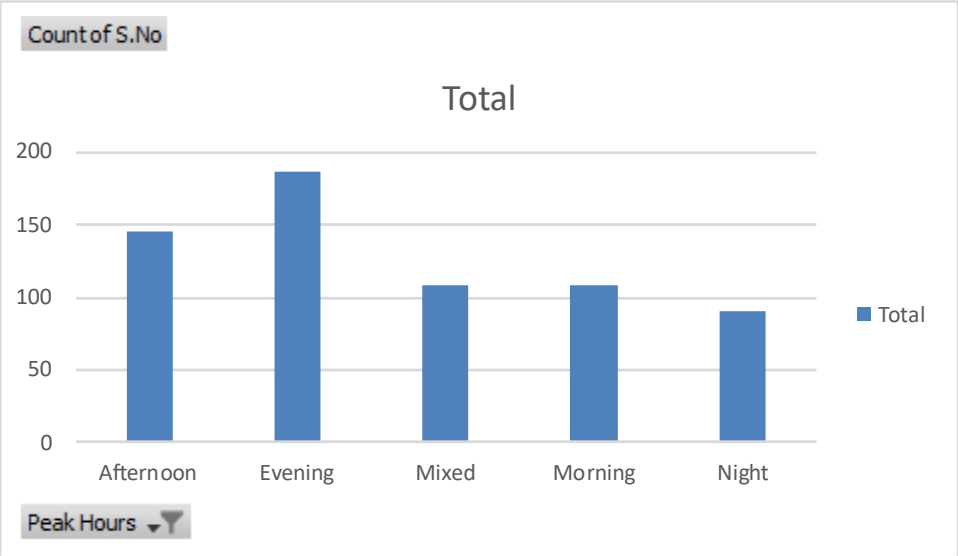
- **Working Days per Week**



Row Labels	Count of S.No
4	4
5	53
6	330
7	252
Grand Total	**639**

Among the surveyed drivers, the majority (330) reported working six days a week, reflecting a nearly full-time engagement with minimal rest. A slightly smaller yet significant group of 252 drivers indicated that they operate all seven days a week, highlighting the extent of economic pressure that leaves little room for or recovery. In contrast, only a very small portion of drivers reported shorter work weeks, with 53 drivers working five days and just a handful working four days. This distribution emphasizes the demanding nature of rickshaw driving as a livelihood, where most drivers maintain long working weeks to sustain their income.

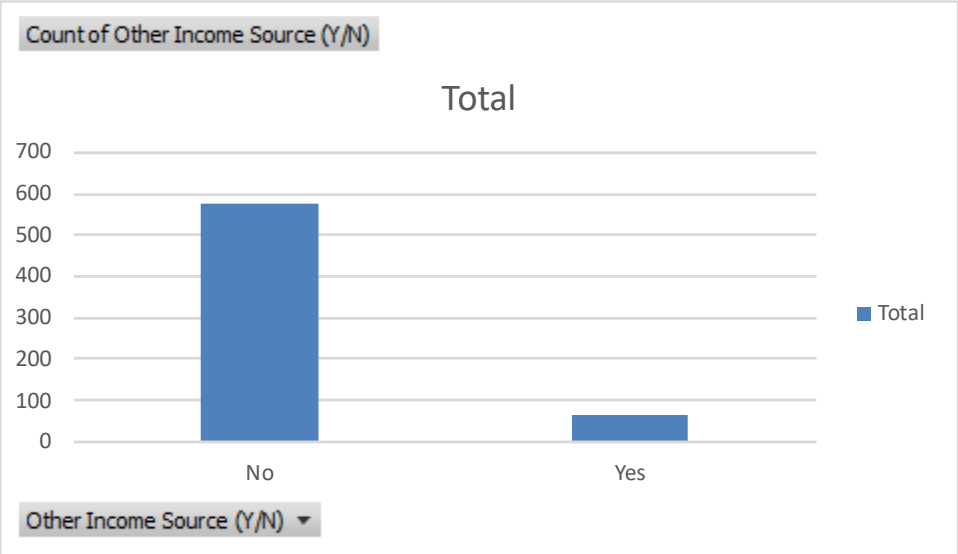
- **Peak Hours**



Row Labels	Count of S.No
Afternoon	145
Evening	187
Mixed	108
Morning	108
Night	91
Grand Total	**639**

Peak-hour analysis highlights the sustained pressure on rickshaws across different times of the day, underscoring their critical role in urban mobility. The data shows consistently high passenger volumes, with the evening period recording the highest average of 187 passengers, followed by the afternoon (145) and morning (108). Even during nighttime, demand remains notable at 91 passengers. These uniformly high figures demonstrate that rickshaws are not limited to specific peak hours but serve as a dependable mode of transport throughout the day. This sustained demand pattern signals the importance of infrastructural and operational readiness to support uninterrupted service, especially during periods of maximum load.

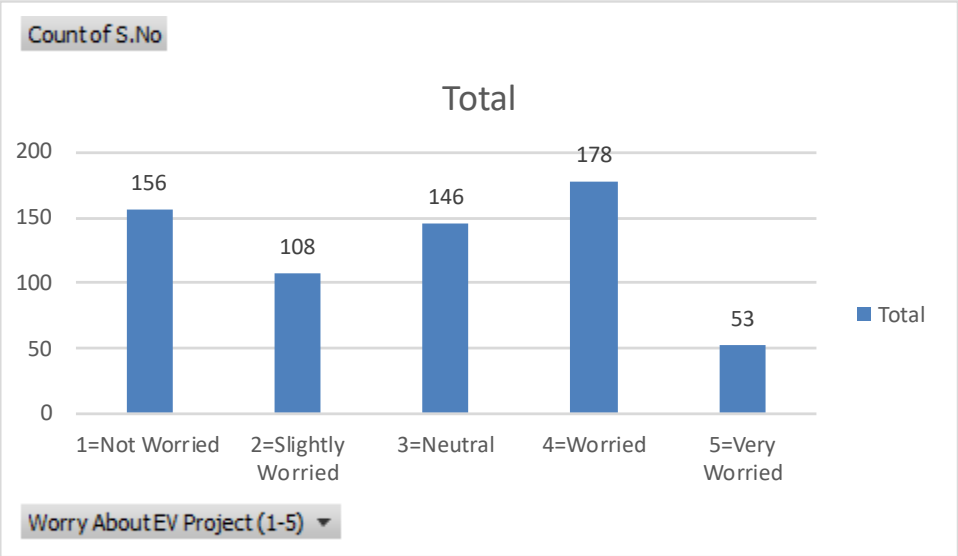
- **Other Income Sources**



Row Labels	Count of Other Income Source (Y/N)
No	575
Yes	66
Grand Total	**641**

The data reveals that over 500 drivers rely solely on rickshaw driving as their primary source of income, reflecting a heavy dependence on a single livelihood stream. This dependence heightens their economic vulnerability, as fluctuations in passenger demand, rising fuel costs, and operational expenses directly affect their financial stability and leave little room for flexibility or resilience.

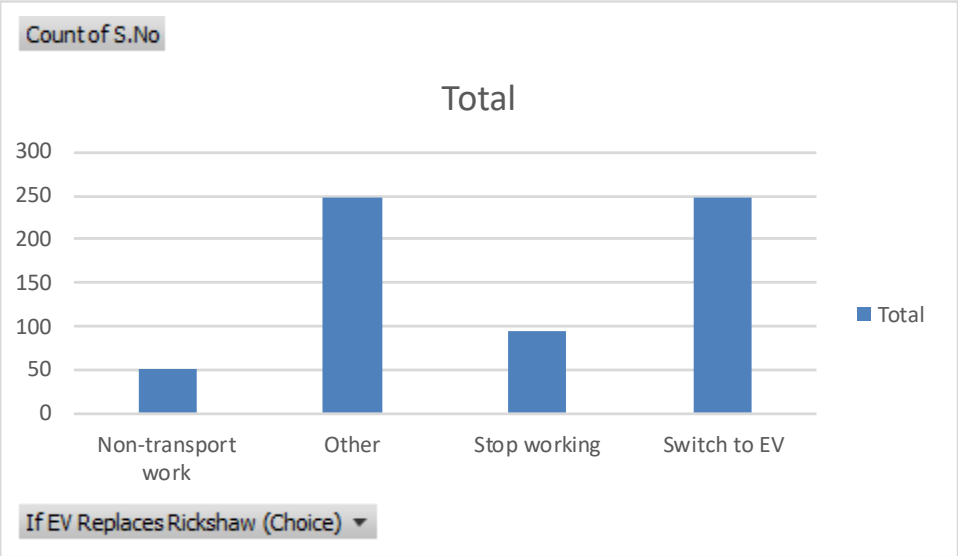
- **Worry about the EV project**



Row Labels	Count of S.No
1=Not Worried	156
2=Slightly Worried	108
3=Neutral	146
4=Worried	178
5=Very Worried	53
Grand Total	**641**

Overall, the survey indicates a promising outlook for the EV transition. A significant number of drivers (156) have expressed clear support for the project, reflecting openness to adopting new technology. In addition, 146 drivers remain neutral, representing a large group that could be positively influenced through awareness campaigns, demonstrations, and policy incentives. While some drivers expressed concerns—ranging from mild skepticism to strong apprehension, these largely stem from uncertainty about operational costs, charging infrastructure, and income security rather than outright resistance. With proper stakeholder engagement, financial support mechanisms, and reliable infrastructure, most drivers could be brought into the supportive spectrum, making the EV project both feasible and sustainable for Quetta's urban transport system.

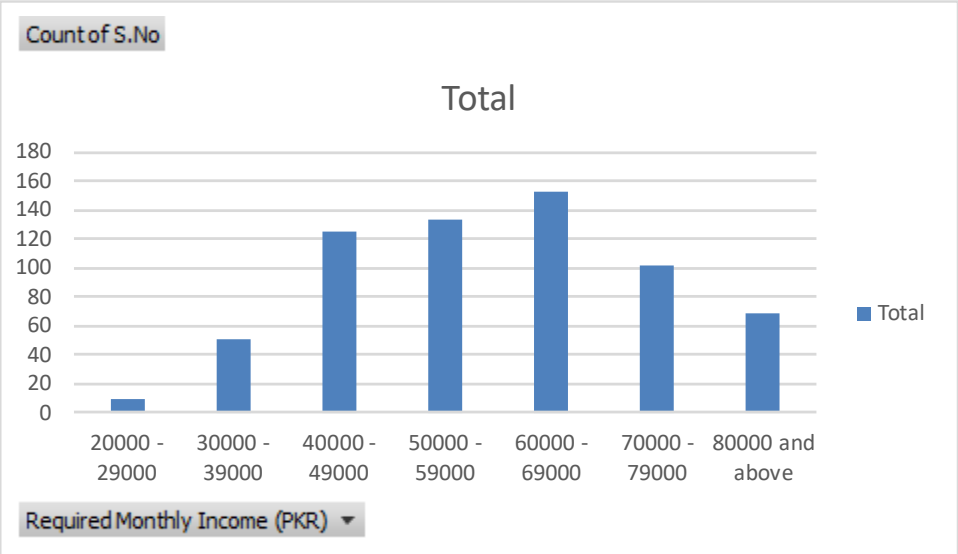
- **If EV Replace Rikshaw**



Row Labels	Count of S.No
Non-transport work	51
Other	247
Stop working	94
Switch to EV	249
Grand Total	**641**

The findings highlight a strong potential for EV Shuttle Services adoption among drivers. A significant group of 249 drivers have already expressed willingness to transition, recognizing clear advantages such as lower operating costs and environmental improvements. While another portion of drivers—247—indicate interest in exploring alternative livelihoods, this can also be seen as an opportunity to design reskilling or financial support programs that align with the city's broader mobility and employment goals. The 94 drivers who stated they would leave the profession altogether represent a relatively smaller segment, whose concerns can be mitigated through targeted incentives and social protection schemes. Overall, the divided outlook underscores both the promise and the responsibility: with the right policies, awareness campaigns, and support structures, many drivers could successfully shift toward EV Shuttle Services , ensuring both livelihood security and sustainable urban mobility for Quetta.

- **Required Monthly Income**

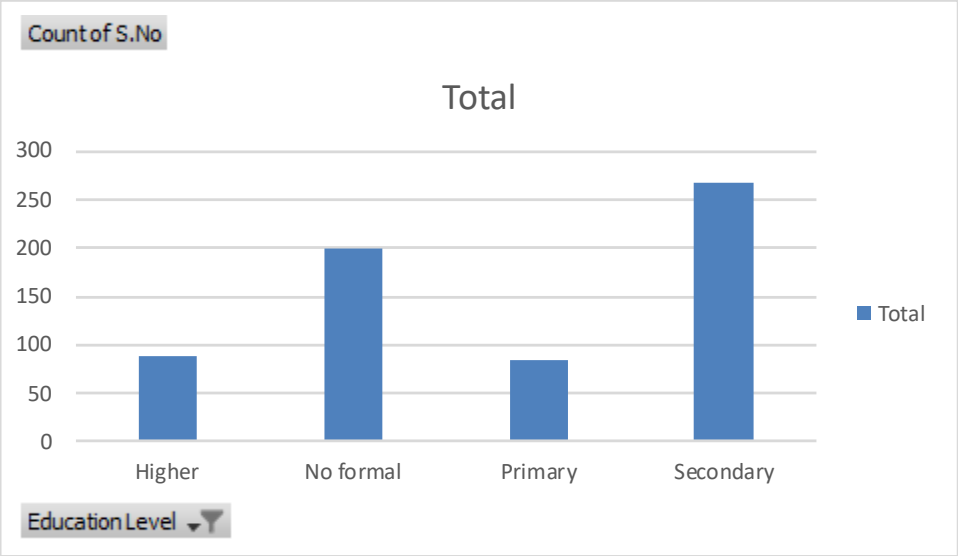


Row Labels	Count of S.No
20000 - 29000	9
30000 - 39000	51
40000 - 49000	125
50000 - 59000	133
60000 - 69000	153
70000 - 79000	102
80000 and above	68
Grand Total	**641**

As part of the survey, drivers were asked to specify the level of monthly income they consider sufficient to manage their household expenses with relative ease. The majority identified a range between PKR 30,000 and PKR 80,000 as their required monthly income, with a higher concentration (153 drivers) pointing to PKR 60,000–69,000 as the most realistic benchmark. Only nine drivers indicated a lower requirement of PKR 20,000–29,000, which further underscores the broad consensus on higher household needs. Establishing this benchmark is vital, as it reflects the economic realities of drivers and provides a measurable target for evaluating improvements. In this context, EV Shuttle Services present a strong opportunity: with their lower operating and

maintenance costs, they can help drivers retain a larger share of their daily earnings, making it more feasible to bridge the gap between current income levels and the required monthly income. This position is EV adoption not only as a technological advancement but also as a practical pathway to improving household financial stability for rickshaw drivers.

- **Education Level**



Row Labels	Count of S.No
Higher	88
No formal	199
Primary	85
Secondary	267
Grand Total	**639**

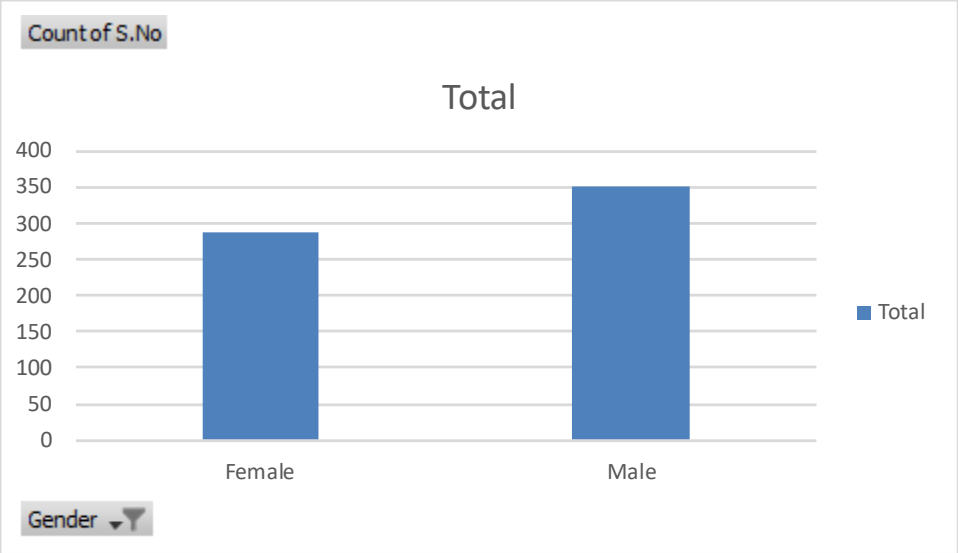
As inquired earlier, upon the introduction of EV Shuttle Services , many drivers initially expressed a preference for seeking alternative or non-transport-related work. However, education emerges as a decisive factor in shaping their opportunities in the wider job market. The data shows that 199 drivers have no formal education, while 85 have only a primary-level education. A majority of 267 drivers hold a secondary education degree, and just 88 have attained higher education. This distribution highlights that most drivers come from educationally disadvantaged backgrounds, limiting their chances of finding alternative employment that could meet their required monthly income. Under these circumstances, the introduction of EV Shuttle Services represents not only a

technological shift but also a practical strategy for sustaining livelihoods. By offering a modernized form of mobility that reduces costs and enhances efficiency, EV Shuttle Services allow drivers to remain engaged in the profession they know best while improving their economic resilience. With targeted training and awareness programs, these drivers can adapt to the new technology with relative ease, making EV adoption both a socially inclusive and economically viable path forward for Quetta's transport system.

- **Commuters Insights**

This section presents the survey-based findings regarding commuter behavior and their perceptions of electric vehicle (EV) technology. The outcomes are displayed through graphical illustrations and supporting data tables, accompanied by descriptive analysis to facilitate interpretation and provide deeper insight.

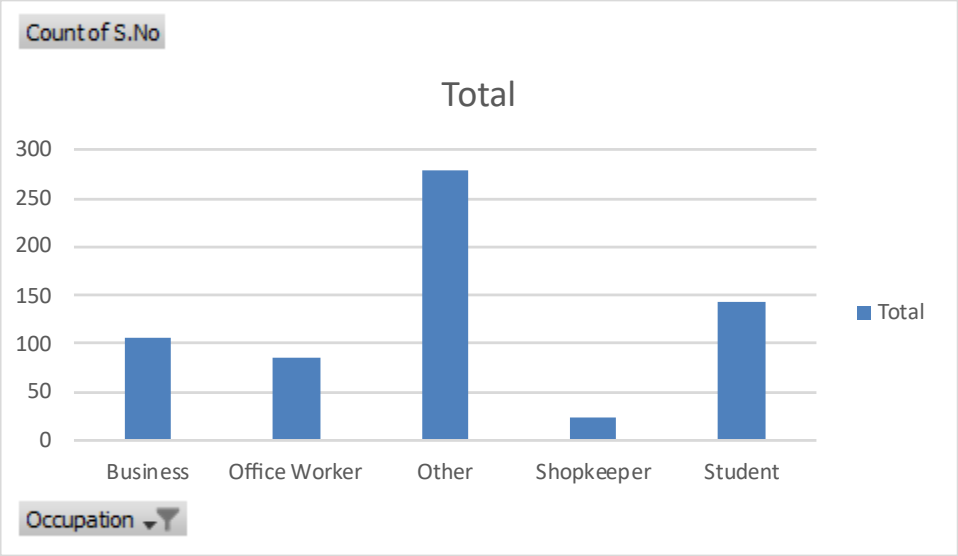
- **Gender of Commuters**



Row Labels	Count of S.No
Female	289
Male	350
Grand Total	**639**

The survey findings confirm that rickshaws are a vital mode of mobility for both genders in Quetta. A total of 289 female passengers rely on rickshaws for their daily commute, alongside 350 male passengers. This near-equal distribution underscores that rickshaws are not just a convenience but an essential transport system for the entire population. For women and girls in particular—who often face greater mobility challenges due to safety, affordability, and accessibility concerns—rickshaws provide a dependable and flexible mode of transport that enables access to education, healthcare, workplaces, and social opportunities. The introduction of EV Shuttle Services will further enhance this inclusivity by offering cleaner, quieter, and more reliable travel, which directly benefits female commuters. Strengthening this system through structured policies, such as regulated fares, improved safety standards, and gender-sensitive planning, ensures that EV Shuttle Services evolve into a supportive and equitable mobility solution for all, with special emphasis on empowering women and girls in Quetta's urban landscape.

- **Occupation of the Commuters**



Row Labels	Count of S.No
Business	105
Office Worker	85
Other	280
Shopkeeper	24

Student	144
Grand Total	**638**

To better understand both formal and informal travel demands, the survey also examined the occupations of Rickshaw commuters. The results highlight that students form the largest group of regular users (144), followed by businessmen (105) and office workers (85). This reflects a highly formal and structured dependence on rickshaws, as they are central to ensuring timely and reliable access to education and employment. At the same time, their informal use remains equally important, with 280 passengers relying on them for personal, household, and social trips. These patterns confirm that rickshaws are not merely a supplementary mode of transport but a backbone of Quetta's daily mobility system. Transitioning to EV Shuttle Services , therefore, must ensure an equal or greater number of units are available to meet this broad spectrum of travel needs. By safeguarding continuity and minimizing disruptions during the transition, EV Shuttle Services can enhance both the formal and informal mobility framework, creating a more reliable, sustainable, and inclusive transport system for the city.

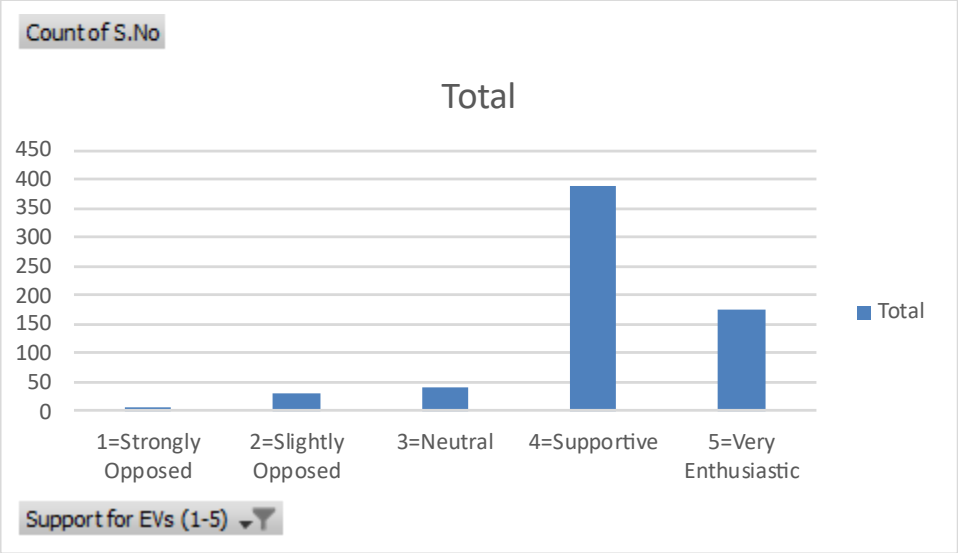
User Demand and Perception Analysis

Interpreting commuters' experiences, insights, and travel behavior provides a clear understanding of how deeply the people of Quetta depend on rickshaws. Commuter perspectives play a decisive role in shaping the trajectory of any transport project, and in Quetta, where mobility choices are severely limited, rickshaws have evolved into a primary travel mode for diverse groups—students, laborers, and office workers alike. Their importance lies in providing quick and reliable access to education, workplaces, and essential services, establishing rickshaws as a formal and indispensable part of the city's mobility network.

The main reasons behind this strong reliance are affordability, accessibility, and minimal waiting times, making rickshaws a natural choice for all genders and social groups. This dynamic suggests that if EV Shuttle Services can maintain the same level of service while offering cleaner, quieter, and more sustainable mobility, public acceptance will likely be high. Commuters have already expressed support for the transition, particularly recognizing the environmental and noise-reduction benefits. However, to ensure a smooth shift, concerns regarding fare adjustments, charging downtime, and availability must be addressed through careful planning and policy safeguards.

International and national experiences with transport innovations consistently demonstrate that commuter acceptance is the single most critical factor in determining success. By incorporating commuter feedback into the EV Shuttle Services transition—through surveys, pilot projects, and fare regulation—policymakers can secure trust and create a mobility system that balances efficiency, affordability, and sustainability. In this context, the ongoing survey of commuter preferences and willingness provides an essential foundation for designing an EV Shuttle Services system that aligns with the needs and expectations of Quetta's residents.

- **Support for EV**

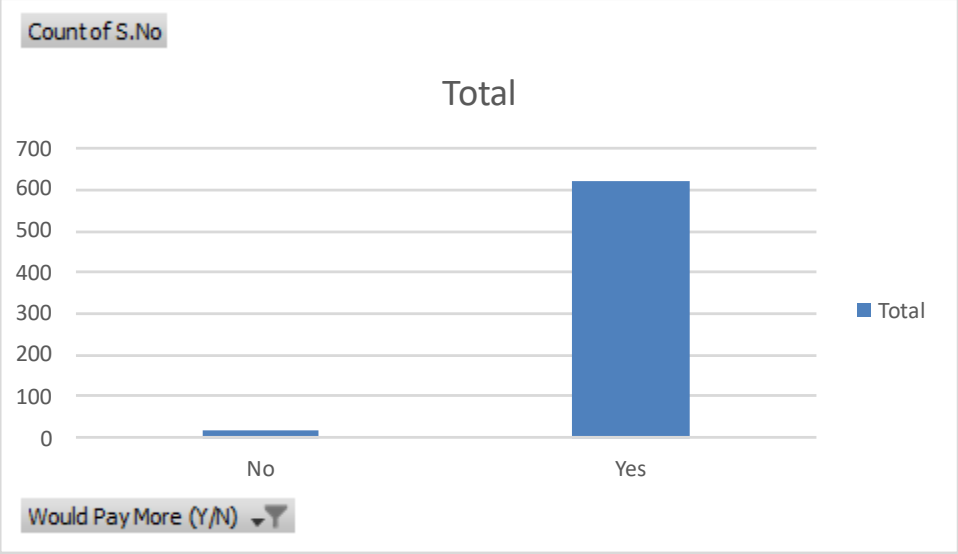


Row Labels	Count of S.No
1=Strongly Opposed	5
2=Slightly Opposed	28
3=Neutral	40
4=Supportive	390
5=Very Enthusiastic	176
Grand Total	**639**

In contrast to the hesitation expressed by some drivers, commuters show strong and consistent support for the adoption of EV Shuttle Services . Among those surveyed, nearly 390 respondents expressed maximum support for the project, while 176 people described themselves as highly enthusiastic, viewing it as a much-needed positive change for the city. Opposition remains negligible, with only 5 respondents firmly against the idea and just 28 showing mild resistance. A very small group of 40 people remained neutral, and only a handful expressed skepticism.

This overwhelming acceptance reflects the lively reality of Quetta's commuters. With limited alternatives for urban transport, rickshaws have become a lifeline for mobility. However, their unchecked growth has contributed to traffic congestion, deteriorating air quality, and rising noise pollution. Commuters recognize the urgency of addressing these challenges and see EV Shuttle Services as a practical solution—one that balances their need for quick, affordable service with the broader demand for a cleaner, safer, and more sustainable environment. The public's willingness to embrace this transition demonstrates not only acceptance but also readiness for a structured and inclusive EV integration strategy.

- **Would Pay More**



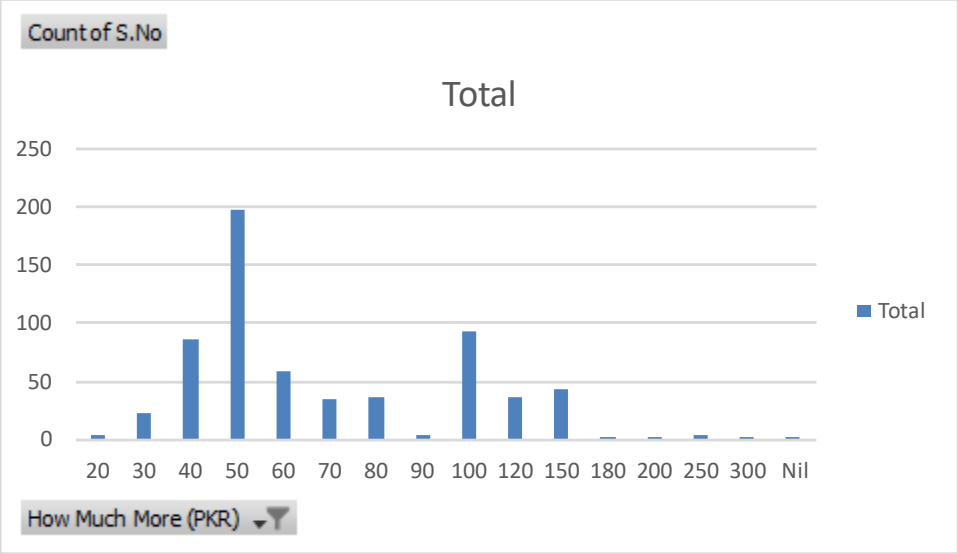
Row Labels	Count of S.No
No	16
Yes	623

Grand Total	639

Taking this as a positive sign, commuters' willingness to pay slightly higher fares reflects strong public inclination to support the EV Shuttle Services project. An overwhelming 623 respondents expressed agreement with paying more for EV rides, while only a very small minority of 16 opposed any increase, preferring fares to remain unchanged. This shows that resistance is not toward technology itself, but only toward the financial burden of higher daily costs.

The findings clearly indicate that people value the environmental and operational benefits of EV Shuttle Services and are prepared to contribute financially toward their adoption. This readiness provides policymakers with a unique opportunity: with carefully structured fare adjustments, subsidies, or phased pricing models, EV integration can be made both acceptable to commuters and sustainable for operators. Ultimately, commuters' willingness to bear part of the cost burden highlights the strength of public support and ensures that EV Shuttle Services can be positioned as a viable and inclusive solution for Quetta's urban mobility challenges.

- **How Much Can They Pay More**



Row Labels	Count of S.No

20	3
30	22
40	86
50	198
60	59
70	34
80	36
90	3
100	93
120	37
150	43
180	1
200	1
250	4
300	2
Nil	2
Grand Total	**624**

While commuters are open to fare adjustments for the adoption of EV Shuttle Services , the range of additional payment they can afford remains modest. The majority—around 200 respondents—are willing to pay an extra PKR 50 per trip, while close to 100 commuters are comfortable with an additional PKR 100. Only one respondent indicated the ability to pay as high as PKR 300. These results provide policymakers with a clear benchmark: fare increases beyond PKR 150–200 per trip would likely face strong resistance and could undermine public acceptance.

This willingness-to-pay spectrum reflects the socio-economic profile of Quetta's rickshaw users, many of whom are laborers, students, and low-income earners. Their limited financial flexibility underscores the importance of designing a balanced pricing strategy—one that ensures the financial sustainability of EV operations without placing undue strain on commuters. Subsidies, targeted support for low-income groups, and phased fare adjustments could bridge this gap. By keeping fares within an acceptable range, policymakers can maintain public trust and ensure that

the transition to EV Shuttle Services strengthens, rather than disrupts, the affordability and accessibility of daily mobility in Quetta.

- **Concerns**

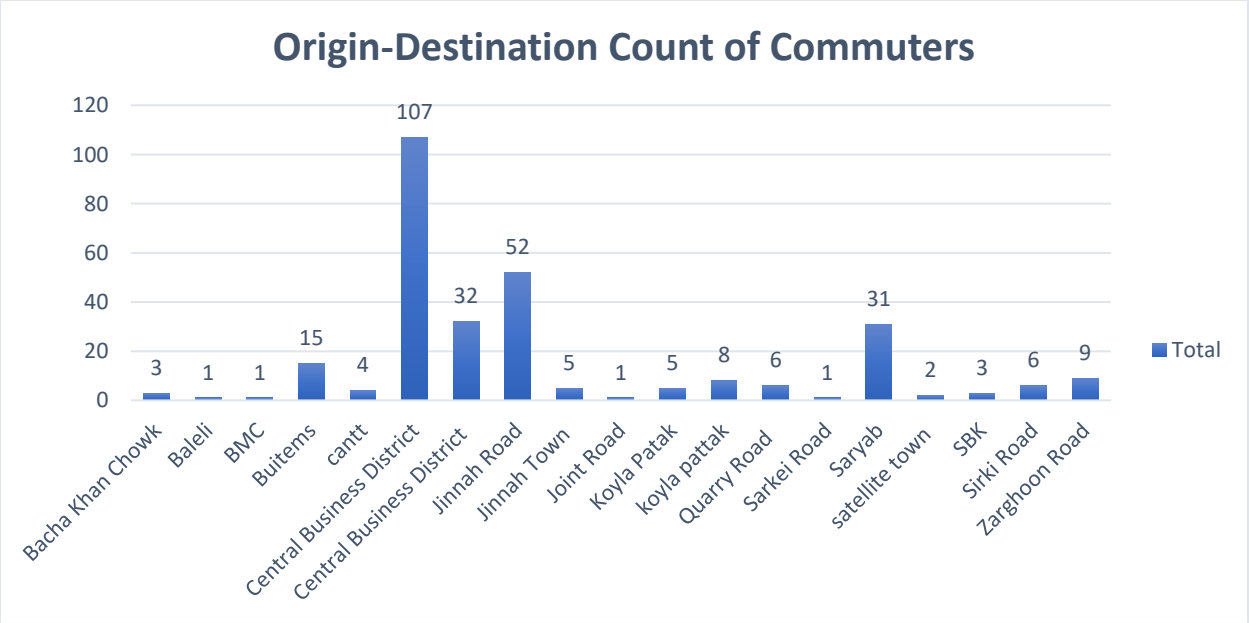
Row Labels	Count of S.No
Charging	156
Delays	136
Other	203
Price	119
Safety	24
Grand Total	**638**

The table indicates that the primary concerns of the respondents revolve around charging, delays, and fare hikes. Approximately 156 individuals expressed apprehension regarding the availability of rickshaw charging stations. Additionally, 119 respondents highlighted concerns that the introduction of new infrastructure and EV Shuttle Services units could significantly raise their daily commuting costs, making it increasingly difficult to travel affordably. Safety was cited as a concern by 24 respondents, while a majority of 203 individuals identified various other reasons.

As a result, many commuters may be compelled either to continue using cheaper but lower-quality services or to bear the financial burden of higher commuting costs. Furthermore, a considerable number of respondents believed that EV Shuttle Services charging would consume more time, potentially making delays a routine challenge for daily users.

Origin-Destination Analysis

- **Commuters Analysis**



Row Labels	Count of Destination
Jinnah Road	1
Airport Road	2
Arbab Karam Khan	1
Balelei	2
BUITEMS	2
Cantt	3
Central Business District	22
Children Hospital	1
Civil Hospital	1
Deba	1
Gulistan Road	2
Gwallmandi	6
Haji Ghaibi Road	2
Hazara Town	1

Jail Road	**2**
Jatak stop	**5**
Jinnah Road	**13**
Jinnah Road	**7**
Jinnah Town	**44**
Joint Road	**5**
kalli Umar	**1**
kamrani road	**1**
Kasi Road	**38**
Kasi Road	**3**
Koyala Patak	**8**
Liaqat Central Business District	**3**
Mariabad	**9**
Mir Ahmed Khan Road	**1**
Nawakilli	**17**
Pashtun Abad	**3**
Saryab Road	**13**
Satellite Town	**21**
Shahbaz Town	**6**
Sirki Road	**20**
Zarghoon Road	**42**

The data analysis identifies eight key destinations exhibiting the highest passenger flow, critical for optimizing traffic and EV project planning within the Quetta region. These destinations include the Central Business District, Satellite Town Airport Road, Nawa Killi, Saryab Road, Shahbaz Town, Jinnah Town, Zarghoon Road, and Kasi Road. Among the 639 surveyed passengers, Jinnah Town records the highest average passenger volume at 44, followed closely by Zarghoon Road with 42, and Kasi Road with 38. The Central Business District emerges as the peak destination, though exact passenger averages require further specification. Additional significant routes include Saryab Road (24 passengers), Satellite Town (21), Sirki Road (20), and Nawa Killi (17).

This distribution highlights the busiest corridors, providing a strategic basis for designating feeder roads and high-traffic zones to enhance passenger connectivity for the proposed EV initiative. Strategically locating EV charging stations near bus stops along these routes will minimize delays and ensure seamless passenger flow, supporting efficient traffic management and infrastructure development.

System Level Implications

The findings of this study highlight that the shift to EV Shuttle Services in Quetta is not merely a replacement of vehicles but a transformative step toward strengthening the city's entire urban mobility framework. It is evident that this transition has direct consequences for infrastructure planning, traffic management, road safety, and environmental sustainability. The scale of impact demands that EV adoption be viewed as a structured urban mobility intervention rather than an isolated technological shift.

According to our recent traffic counts, three-wheeler rickshaws account for nearly 20–24% of total traffic within the Central Business District (CBD). This share is disproportionately high when compared to their carrying capacity and operational footprint, meaning that rickshaws contribute substantially to congestion, delays, and inefficient traffic flow. Furthermore, figures from the City Traffic Police Department confirm that only 11,400 rickshaws in Quetta hold legal operating permits, leaving a large number unregulated and outside any formal traffic management or safety framework. This mismatch between demand, legality, and road capacity has been a major contributor to chronic congestion and unsafe operating conditions.

Replacing conventional rickshaws with EV units directly addresses two of the city's most pressing concerns—environmental degradation and traffic inefficiency. With zero tailpipe emissions and far lower noise output, EV Shuttle Services represent a practical and immediate solution to improve Quetta's air quality and reduce noise pollution, which has become a serious urban health issue. In addition, EV technology reduces fuel dependency, lowering operating costs in the long run and providing stability against fluctuating fuel prices.

However, realizing these benefits requires a well-planned policy framework. The success of the EV initiative depends on building trust among both commuters and drivers through a single, reliable source of information. In Quetta, where misinformation can quickly undermine adoption,

structured awareness campaigns and training workshops will be crucial. Many drivers, already operating on narrow margins, are skeptical about investing in new technology. Without proper engagement, some may even consider leaving the profession, which would harm both livelihoods and the government's mobility plans. Demonstration pilots, financial literacy programs, and transparent communication are key tools to overcome this skepticism.

From a traffic operations standpoint, the placement of charging stations must be carefully aligned with high-ridership corridors and CBD entry/exit points. Integration into the existing road network should be done strategically so that charging facilities do not obstruct or further congest major arteries. Properly distributed charging nodes will reduce turnaround delays for drivers, improve reliability for commuters, and ensure that EV Shuttle Services support, rather than disrupt, the traffic flow.

Given that rickshaws are predominantly used by low-income commuters, a phased transition strategy with gradual fare adjustments is essential. A sudden increase in fares would disproportionately affect these groups, leading to resistance. A gradual approach provides the breathing space for both drivers and commuters to adapt to the new system without undue financial burden.

Finally, the transition provides an opportunity to strengthen the city's regulatory environment. With a significant number of rickshaws operating without permits, EV adoption should be tied to stricter licensing, safety standards, and transparent fare regulations. At the same time, fair subsidies, soft financing options, and targeted driver-support programs must be introduced to make adoption financially feasible. Without such measures, most drivers who barely meet their household needs—will be unable to transition voluntarily.

In conclusion, the introduction of EV Shuttle Services in Quetta should be recognized as a system-wide mobility reform rather than a simple vehicle replacement. If backed by strong regulatory enforcement, infrastructure planning, and driver-support mechanisms, the project has the potential to significantly reduce congestion, improve safety, and enhance environmental quality. With rickshaws contributing nearly a quarter of CBD traffic, this transition represents a rare and urgent opportunity to reshape Quetta's transport system into one that is more sustainable, efficient, and socially inclusive.