

Customer Facilitation in the Adoption of
E-BIKES | Towards Decarbonizing
the Transport Sector

About Us

Who we are

We are a dedicated team of researchers and experts who recognize the urgent need for action in addressing climate resilience and energy transition in Pakistan. Our mission is to develop and implement effective policies for cleaner, renewable energy sources like solar and wind, aligning with Pakistan's 2030 goal of 30% renewable energy in its electricity mix. As a multidisciplinary team, we leverage expertise in three key disciplines of study—Energy Systems Engineering, Thermal Energy Engineering, and Electrical Power Engineering—to drive our mission forward. We are united by a shared vision of creating a sustainable and resilient future for Pakistan, where cleaner energy sources play a pivotal role in reducing the nation's vulnerability to climate-related challenges.

What we do

We conduct in-depth, evidence-based research to analyze and improve energy policies in Pakistan. Our focus is on advancing renewable energy solutions and engaging stakeholders to ensure effective policy implementation. Our methodology involves a critical examination of current energy policies to pinpoint areas of improvement and formulate strategies for the widespread adoption of renewable energy sources across various levels.

In line with our commitment to fostering sustainable practices, we have established a fellowship program as part of our broader initiatives that aims to facilitate evidence-based research for promoting energy transition in Pakistan. Through research studies, surveys, and forecasting, we plan to assess various aspects of energy transition, including the adoption of renewable energy technologies and their impact on climate change. Our approach involves active engagement with stakeholders to address their concerns and facilitate the effective implementation of policies, fostering the growth of renewable energy manufacturing and marketing facilities.

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Executive Summary

This report explores the potential for transitioning from fossil fuel-based 2-wheeler vehicles to electric bikes (e-bikes) in Pakistan's transportation sector. The social benefit of this transition is reduced carbon emissions and sustainable mobility. The study focuses on understanding consumers' perception of e-bike use, challenges faced by suppliers, and the financing landscape for e-bikes. The research is aligned with Sustainable Development Goals (SDGs), particularly SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action).

The automobile sector is evolving globally towards cleaner technologies due to environmental concerns. In Pakistan, a gradual rise is evident in private vehicles, especially motorbikes, contributing to pollution and financial costs. E-bikes offer a viable alternative, aligning with the global shift towards electric transportation. However, their adoption is hindered by various factors, including policy challenges, infrastructure concerns, and financing difficulties.

The study presents findings from a user survey, supplier responses, and interviews with bankers. The user survey gauges satisfaction levels with e-bikes, covering aspects like driving experience, speed, cost per kilometer, pollution reduction, and safety standards. The responses indicate a generally positive perception of e-bikes among users. However, concerns about purchase price and distance coverage remain. Supplier responses from ezBike, a

prominent bike-sharing company in Pakistan, highlight challenges such as financial constraints, bike damage, asset management, and on ground operations in different communities. These insights shed light on low incentives for offering e-bike sharing services.

Availability of bank finances can accelerate the E-bike adoption among commuters. We interviewed banker and find that most commercial banks in Pakistan are currently not providing finance to e-bikes customers, primarily due to the issues related to the lack of standardized bikes and e-bike manufacturers. Extremely high interest rates are also a big hurdle to attracting consumers. However, there is potential for regulatory intervention from the government and the State Bank of Pakistan to promote financing for e-bikes as part of environmental responsibility initiatives.

In conclusion, promoting e-bike adoption is pivotal in achieving SDGs related to clean energy, sustainable cities, and climate action. Overcoming challenges through advocating for regulatory support, provision of charging infrastructure at workstations and markets, promoting standardized e-bike models, ensuring availability and dealership networks, and facilitating affordable financing options to enhance accessibility for a broader demographic. The findings underscore the potential of e-bikes in reducing the environmental footprint, easing traffic congestion, and improving the overall transportation landscape in Pakistan.

1. Introduction

The automobile sector is transforming worldwide from fossil fuels-based automotives to relatively more efficient and clean technologies such as hybrid or electric modes of transportation attributable to rising concerns of environmental degradation (Weinert et al, 2007). International Energy Agency (IEA) forecasts around 250 million electric vehicles by 2030. In addition, most energy-deficient developing countries expect considerable expansion in motorbikes and e-bikes in the near future. Industry experts predict that 2-wheelers and 3-wheelers offer the best potential for a partial shift to electric vehicles in Pakistan's economy that is facing persistent high inflation that eroded the paying capacity of lower-middle income households (Hussain et al., 2022; Yasir et al., 2022).

The culture of bicycle riding as a mode of transportation is dying in Pakistan. This change in commuters' behaviour is manifested in built infrastructure and expansion of cities alongside the extreme weather in the country. Private cars and motorbikes have increased considerably during the last two decades. This motorization puts an extra financial cost on the users and emissions burden on the environment. Over one-third of the final energy supply goes to the transport sector of the country. The share of intracity traveling cost is gradually becoming a significant component of households' budgets, and the fact is that a modern affordable mass transit system does not exist even in big cities. Nonetheless, adoption of an electric bike (e-bike) has the

potential to reduce the trips performed with other modes of transportation alongside encouraging new trips without raising concerns of urban pollution from greenhouse gas emissions. Therefore, e-bikes are a comparable replacement mode that is more efficient and economical. Recently, China and many European countries are adopting e-bikes technology rapidly for commuting (Weinert et al., 2008; Campbell et al., 2016; Hu et al, 2021; de Haas et al., 2022).

From a policy perspective, e-bikes can replace many motorbikes and cars using fossil fuels (Salmeron-Manzano & Manzano-Agugliaro, 2018; Andersson et al., 2020). Therefore, it is high time to switch to e-bikes through incentive policymaking in Pakistan. The potential financial and environmental benefits of e-bikes depend on the mode it replaces, and currently, the benefits in terms of economic and environmental costs are exceptionally high for the country. This study addresses the need for a thorough review of literature identifying the factors affecting e-bike adoption and bike-sharing demand. The literature highlights the significance of critical factors related to E-bikes like weather, road infrastructure and land use, public transportation availability, socioeconomic and demographic elements, and on-road safety regulations.

Electric bicycles (e-bikes) represent one of the fastest-growing segments of the transport sector in developing countries. Although the use of two- and three-wheelers is quite common in many less-developed countries, but these modes are based on motor engines. In general,

adopting a transportation mode may be grounded in users' perception of the product and its outcomes, given the road infrastructure, traffic rules, and policies in force (Fishman & Cherry, 2016; Patil & Majumdar, 2022). Environmental policies and rising energy costs also trigger the shift from motorized modes to electric modes. Both researchers and policymakers consider e-bikes as a mode that promotes sustainable transportation at a lower financial and environmental cost (MacArthur et al., 2014). However, many individuals may either be ill-informed or unprepared for the e-bike adoption or disagree with the practical usefulness of this change from bicycle or motorbike to electronic bike. To identify the major challenges, this study finds the perception of bike users, investors, and bankers/financiers about e-bikes and shared e-bike systems.

The proposed study is highly significant and relevant to several Sustainable Development Goals (SDGs) and climate action. Overall, the study has a policy significance for customer facilitation in adopting e-bikes as a move towards decarbonizing the transport sector that has great significance and relevance in helping achieve several SDGs and climate action. It further makes it an essential area of research. Some of the most related ones are mentioned below. Firstly, adopting e-bikes as a mode of transportation can contribute to achieving SDG 7 - Affordable and Clean Energy. E-bikes are powered by electricity, which can be a clean and renewable energy source and may help reduce greenhouse gas emissions. Secondly, the study topic also relates to

SDG 11 - Sustainable Cities and Communities, as e-bikes can help reduce traffic congestion, improve air quality, and provide an affordable and sustainable mode of transportation for people living in cities. Thirdly, the study can contribute to SDG 13 - Climate Action, by providing insights into how to facilitate the adoption of e-bikes and other clean modes of transportation, which can help reduce carbon emissions from the transport sector.

1.1 Objectives of the Study

The following are the key objectives of the study.

Firstly, the study examines consumers' perception of E-bike technology diffusion and identifies major hurdles compared to conventional motorbikes. To wit, we find the institutional and policy bottlenecks in E-bike adoption.

Secondly, the study evaluates the benefits and costs of alternative models of private E-bike use versus shared E-bikes based on financing options. The investors' perspective on benefits and challenges was assessed, like the investment payback period and other risk factors.

Thirdly, the study assesses the availability of bank financing by interviewing the informants belonging to the commercial and central banks.

To achieve the first objective, the E-bike users conducted a questionnaire-based survey. The sample included current and prospective users, and their perception of the technology was assessed on parameters such as ease of use, efficiency, finance, and infrastructure. For this survey,

a stratified sample of 230 was selected from Islamabad; however, the declining rate was 15%. The survey will also assess the concerns regarding the infrastructure, such as charging facilities, measures for on-road safety, and theft control. We will rely on the graphical analysis using MS Excel software for this objective. For the second objective, we will focus on both models' risk factors and try to find an effective model for each community, consumer class, and gender. As mentioned above, the survey covers this aspect, and we will ensure the representation of respondents from diversified demographic, economic, and geographical profiles. This component will be analyzed by adopting a logistic regression model using the EViews software, and estimation results will be interpreted and discussed. The third objective is covered through interviews with bank practitioners and bank executives. The interviews assess the banking risk of E-bike financing, and we seek the perspective of finance providers on the potential risks and challenges for making a workable model for low-middle-income families in Pakistan. We interviewed 25 bankers from Islamic and conventional banks; 10 were area managers, and the rest were either Branch Managers or Car Lease Officers. The findings are drawn from the qualitative data, and we discuss the findings in Section 3.

1.2 Literature Review

The literature on the topic of E-bikes adoption focusses mainly on three aspects including reduced carbon dioxide emissions of motorbikes and vehicle use (Zhou et al., 2023), travel cost reduction through shared E-bikes (Campbell et al.,

2016) and mode choice and substitution (Cherry C., & Cervero R. (2007; Hu et al., 2021; Hu et al., 2022; Reck et al., 2022). Acting as a sustainable travel mode, electric bikes (e-bikes) can overcome the shortcomings of conventional bicycles (physical fatigue and increased travel time on medium/long distances), cut greenhouse gas emissions and fuel consumption, improve air quality, and place less demand on road and parking space (Dill & Rose, 2012; Fishman & Cherry, 2016). Most research examines the built environment's impact and distances between residential and work locations on individuals' commute mode choice, mainly focusing on using e-bikes (for example, Rose G. (2012; Hu et al., 2021). The developing countries witnessed rapid growth in e-bike technologies, and private e-bike rides and public bike share systems are becoming widely popular. China leads this transition, followed by many other developing and developed countries (Cherry & Cervero, 2007; Eren & Uz, 2020). Reck et al. (2022) find that trip distance, precipitation, and access distance are fundamental to micro-mobility mode choice. Bikeshare demand is strongly negatively impacted by trip distance, temperature, precipitation, and poor air quality (Weiss et al., 2015; Campbell et al., 2016). The study shows that e-bike share systems generally appeal to a specific socioeconomic and demographic group, like young to middle-aged males in China who tend to have low income, and low education. It also finds that commuter demographics play a significant role in e-bikeshare demand. Substitution patterns reveal that personal e-scooters and e-bikes emit less CO₂ than the transport modes

they replace, while shared e-scooters and e-bikes emit more CO₂ than the transport modes they replace (Eren & Uz, 2020; Eccarius & Lu, 2020; de Haas et al., 2022). Fyhri et al. (2019) applied logistic regression to compare bicycles and e-bikes to examine the overall risk of accidents increase for e-bike users. The study controls for age, gender, and exposure, and the results suggest that females have a higher accident risk on e-bikes than men. There is no risk difference for males between using e-bikes and ordinary bicycles. E-bikes and bicycles are similar in causing severe accidents, and balance problems with e-bikes cause a slightly higher prevalence of accidents.

A person's decision to use E-bike for travelling to work depends on whether a workplace provide parking and charging facilities at the place of work (Heinen et al., 2010; Guidon et al., 2019). Although all the E-bike riders do not attach the high value to safety of bike parking facilities, but young bikers and individuals with more expensive E-bikes prefer secure parking facilities even if they must pay for it (Ma et al., 2019; Bigazzi & Wong, 2020). Hussain et al. (2022) examine the consumer's satisfaction with an e-bike-sharing facility called BYKEA in Pakistan using a quantitative approach. The respondents were cautious about price increases and e-bike design. Sundfør and Fyhri (2017) studied the impact of e-bike use on the level of physical activity and public health, and their finding shows that switching to e-bikes eliminates the physical activity associated with bicycle riding.

2. Approach and Methodology

The study surveyed bike users (motorbikes and electric bikes) to evaluate the users' preferences and satisfaction with electric bikes vis-s-vis a motorbike. The survey chooses respondents from NUST, a gated community offering shared e-bikes, and from two sectors of Islamabad where EzBike operates. The responses were gathered by distributing a questionnaire among the respondents or contacting them online. A Google form was developed for an online survey, and invitations were sent to potential respondents. About 201 respondents living on the campus or in Islamabad city agreed to participate in the survey. The sample of riders is collected through the snowball sampling technique. The questionnaire covered the riding experience, energy cost, safety, and the perception regarding environmental aspects of a respondent's e-bike use compared to motorbike use. It further asks questions regarding the experience of a shared e-bike system. The qualitative data is analyzed through graphs, and discussion is presented in the following sections. We obtained 201 observations from bike users and 20 interviews from bankers.

The perspective of ezBike service provider is also obtained through a detailed interview. The ezBike is the only shared e-bike service provider in Islamabad. We also conducted interviews with the bankers to assess the chances of financing e-bikes through commercial banks. This part is qualitative, and bankers' perspective provides the critical challenges to the consumers' adoption of e-bikes despite high fuel prices in the country.

3. Major Findings / Results

The qualitative data analysis for the three segments of the e-bike market are presented in the sub-sections given below.

3.1 Users Survey

Field survey is conducted to collect information about E-bike adaptation for which we designed a structured questionnaire. In this part of the study, we conducted 201 interviews with e-bike users including actual and potential users (that is, conventional motorbike users). The data sites include the NUST main campus; International Islamic University, Islamabad; COMSATS University, Islamabad, and NOVA Academy G-10 in which we asked participants about the reasons why they should invest in E-bike based on how they rate their experience of e-bike ride. The survey records the positive and negative aspects of e-bike use based entirely on their experience and perception. Most of the interviews were conducted physically (86 %) and some of the responses were collected using an online questionnaire through Google Forms (14 %).

Several important themes emerged from the interviews. The functional characteristics of e-bikes vary from conventional bicycles and motorbikes notably in terms of speed and acceleration and E-bike causes varying levels of exertion as compared to other two modes. E-bikes enables commuting in cost efficient manner that may result in more trips, and more fun for their users (Hull & O'Holleran, 2014; Reck et al., 2022). The result for these

users was an overall decrease in driving, with some users getting rid of their cars altogether. Negative aspects cited by users include concerns regarding bike security from theft or damage, health and safety concerns, unwieldiness, and range anxiety (Nguyen et al., 2023). The field survey also highlighted several misperceptions by motorbike-users that could inhibit the e-bike adoption. These results provide insights for developing policy conducive for e-bike users and provide guidelines for future research.

Figure 1 shows the age distribution of our respondents that ranges from 17-35 years. The figure clearly shows that about 60% of the respondents are in the 21-25 years bracket. Relating this information with Figure 2 will indicate that most of the respondents are students in their undergraduate programs. Table 1 summarizes the bike riders. It shows that E-bike users are satisfied with the quality of ride in general. We can mention particularly the Driving experience, Pollution generation, cost per km, Impact on social status and easy to operate feature of an E-bike. Almost half of the respondents are satisfied with the safety standards of E-bikes. The table shows the highest number of less satisfied respondents in the response category of maximum attainable speed (27.3%), followed by the distance covered with one filling (24.9%), and purchase price (23.9%). Figure 3 gives some responses of the bike users pertaining to their perception about suitability of E-bikes for carrying out daily routine commuting in percentages and 51% of the respondents find it suitable in this context. The numbers 1& 2 represent 'not suitable' and 'less

'suitable' respectively while, 4 & 5 represent 'suitable' and 'highly suitable' respectively. The respondents who are 'indifferent' gives response 3.

Figures 4 and 5 present the Response Distribution of the E-bike Visibility on road and in electronic and print media and only 17 % and 10% of respondents are of the view that visibility is high on road and in media respectively. Low visibility is an indication of low consumer confidence to purchase an E-bike. It can be compared with motorbikes that are considered a liquid asset that can be converted into cash whenever required and resale value of motorbikes is high due to the huge market. Figure 6 shows that 72% of our respondents experienced E-bike rides which enabled them to compare motorbikes and e-bikes. Later, only a fourth of the respondents use E-bike for their routine commuting like going to university, market or academy as shown in Figure 7. Figure 8 shows that a handful number of respondents (64%) state that they use E-bike for reaching Metro bus stations. Figures 9, 10 & 11 show the responses of the users on the shared E-bike facility and

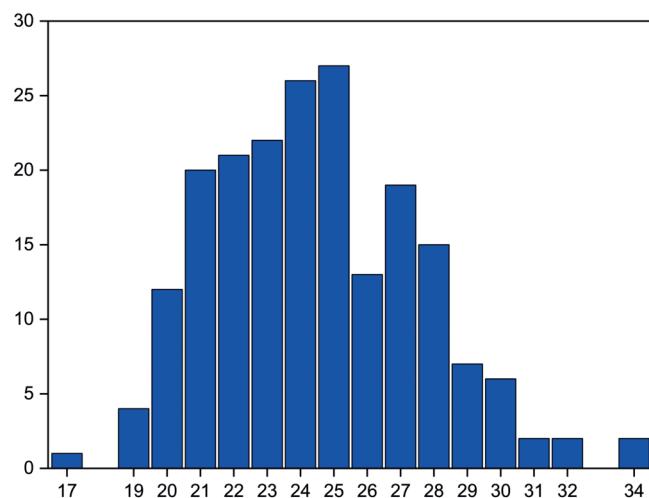


Figure 1. Age Distribution of the Respondents

the results are mixed. Figures 12, 13, 14, and 15 highlight interesting information of the respondents' transport use profile.

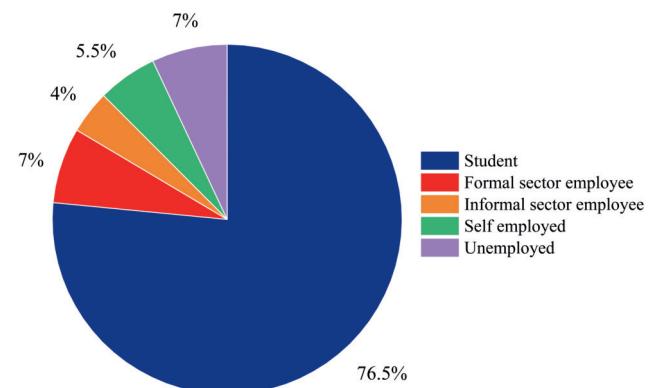


Figure 2. Employment Status of the Respondents

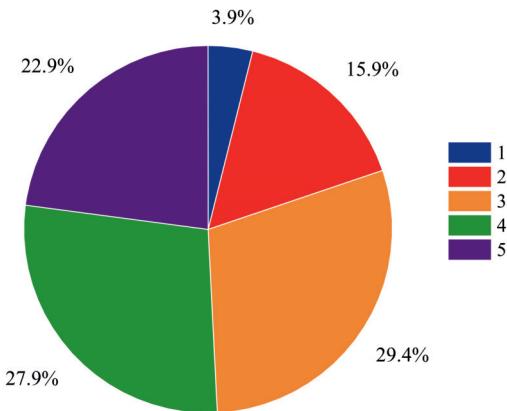


Figure 3. Response Distribution of the E-bike Suitability to Carry out Daily Tasks
(1=Not suitable to 5=Highly suitable)

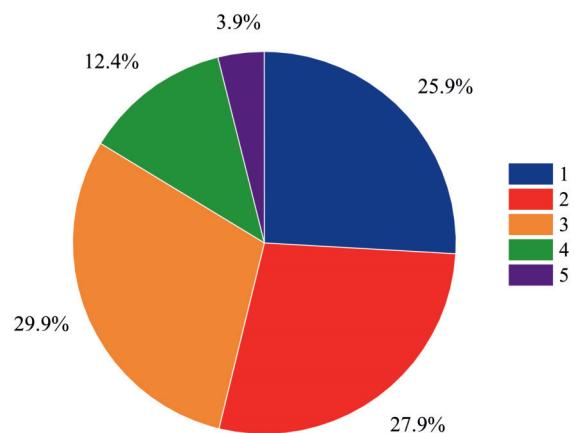


Figure 4. Response Distribution of the E-bike Visibility on Road (1=low to 5=High)

Table 1: Summary Table of E-bike Users' Survey (in percentage)

Serial No.	Item	Highly Satisfied	Indifferent	Less Satisfied
1	Driving experience	55.7	29.9	14.4
2	Speed performance	29.9	46.3	23.8
3	Attainable maximum speed	34.9	37.8	27.3
4	Cost per Km	57.8	27.4	14.8
5	Pollution generation	65.2	20.4	14.4
6	Purchase price	37.8	38.3	23.9
7	Safety standards and comfort	48.8	34.8	16.4
8	Impact on social status / have a positive image in society	60.2	24.4	15.4
9	Easy to operate	70.1	19.4	10.5
10	Distance covered with one filling	38.4	36.7	24.9

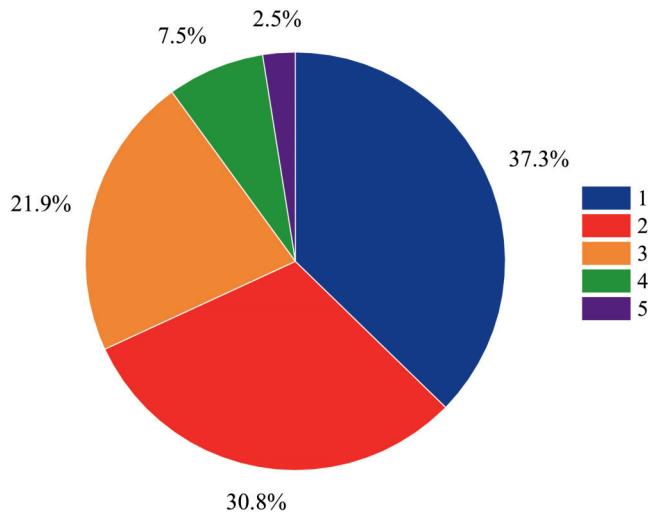


Figure 5. Response Distribution of E-bikes Visibility on Electronic Media (1=low to 5=High)

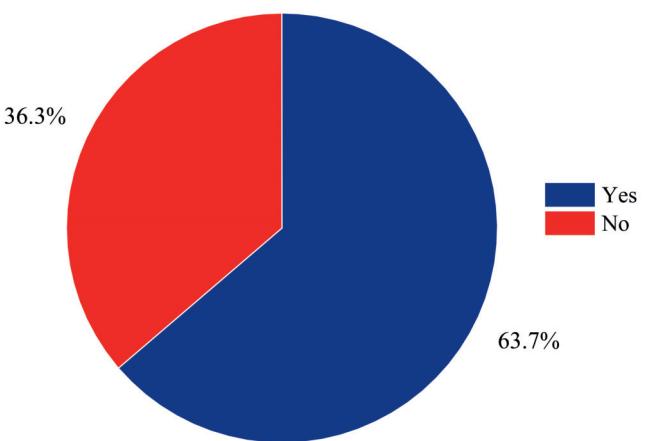


Figure 8. Respondents use of E-bike for Accessing Metro Bus Routes

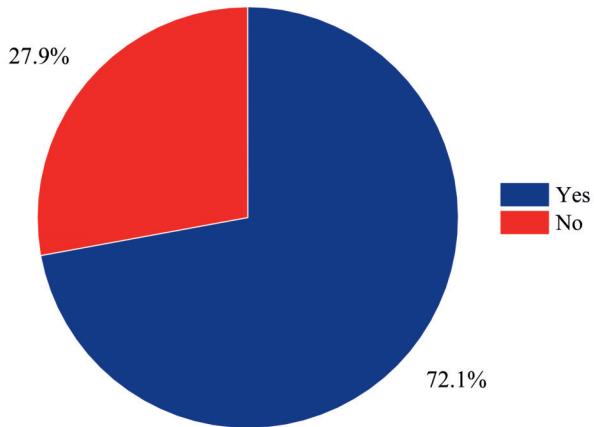


Figure 6. Response Distribution of E-bikes Use Experience

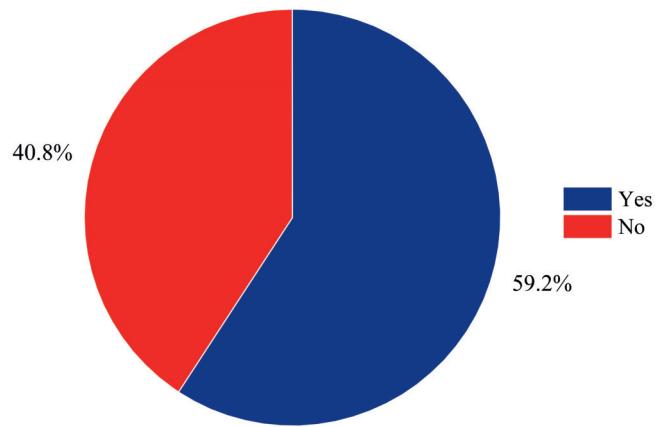


Figure 9. Respondents' Perception about Shared E-bikes Maintenance

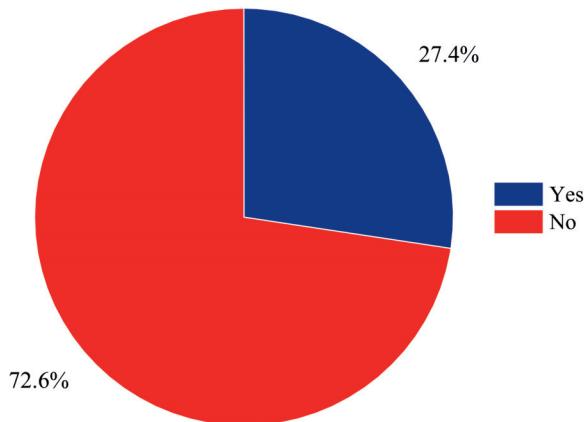


Figure 7. Response Distribution of E-bikes Use for Routine Travelling

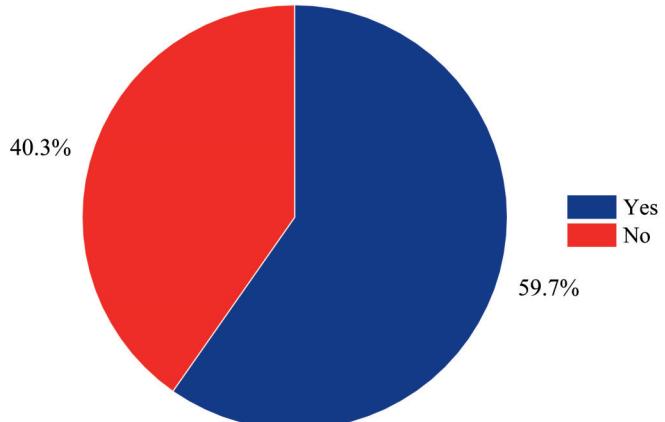


Figure 10. Respondents' Perception about E-bikes Service Providers

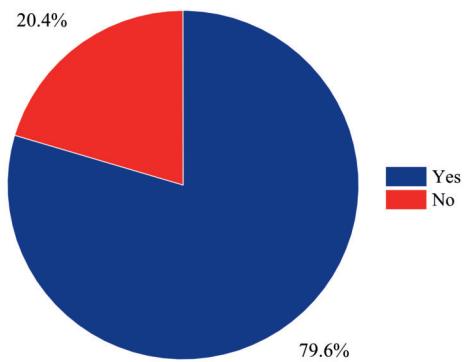


Figure 11. Should E-bikes Service be Provided in Other Localities

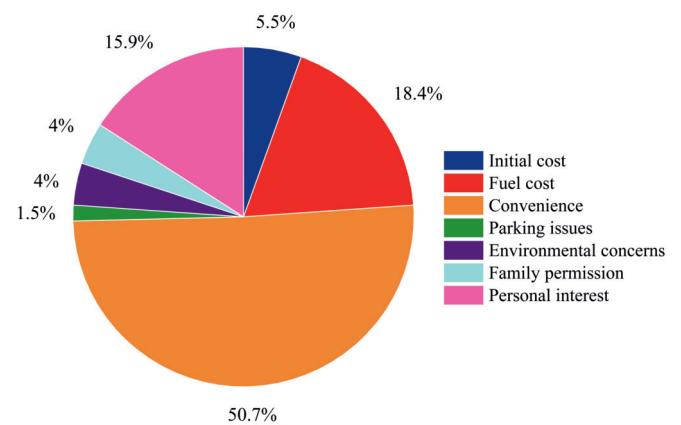


Figure 14. Reason for the Use of Transportation Modes as Mentioned in Figure 12

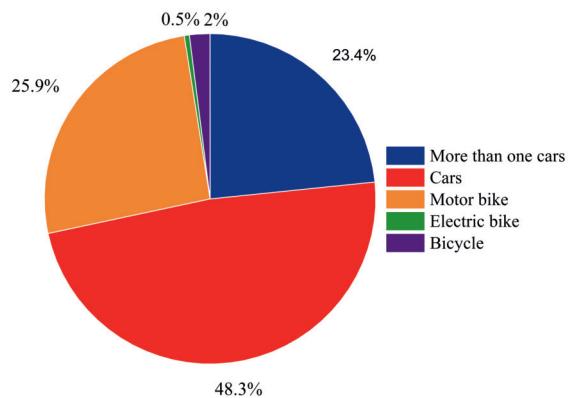


Figure 12. Vehicles Owned by the Respondent's Family

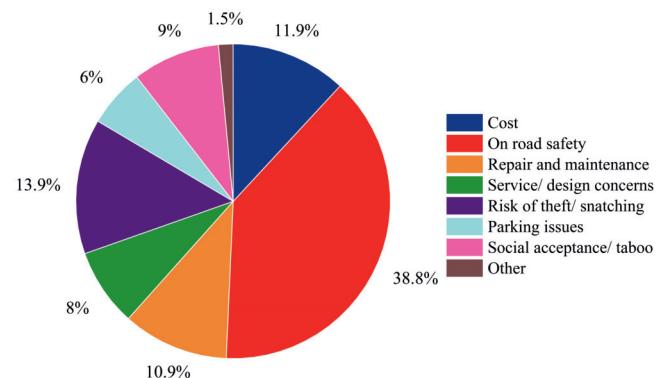


Figure 15. Respondents' Perception about Risks in Using E-bikes as a Transportation Mode

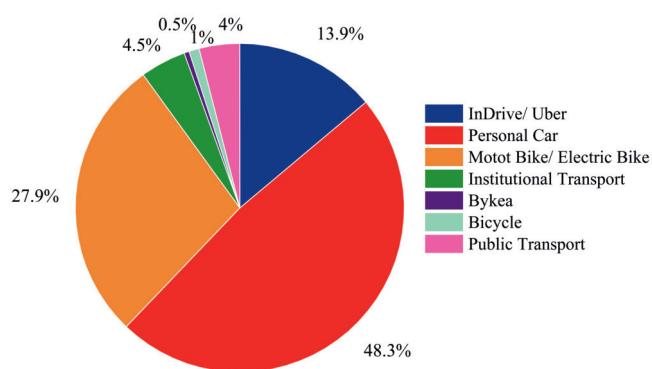


Figure 13. Transportation Modes Owned by the Respondents' Family

3.2 Supplier Response

E-bike suppliers face a range of unique challenges and concerns that impact their operations and growth within the market. These concerns encompass various aspects, including limited public awareness and understanding, trust deficit between potential buyers and the manufacturers, oil market dynamics, regulated gasoline price fluctuations, infrastructural limitations, and the consumers' perception. Some of these concerns may be related to maturity of the e-bike manufacturers, but from a policy perspective an understanding of these concerns is vital for devising effective strategies and policies to support the growth and adoption of e-bikes in the country.

We contacted the CEO of ezBike, the only e-bike-sharing company operating in Pakistan. They created technology and started with CYKIQ- a shared bicycle facility in 2014. After COVID-19, ezBike was launched, and the e-bikes were imported from China and assembled in Pakistan. The company started its operations in Islamabad and operates in only a few sectors. The CEO informed me that initially they negotiated with JS Bank for finances, but it cannot be materialized due to negotiation terms of the bank. Hence, the company did not get finances from any bank to initiate its operations. ezBike is experimenting in gated communities like NUST and non-gated communities like Sectors F7 and F8 in its first phase during the last 4 years. There are multiple challenges to the operators, such as bike damage, managing the bikes at hot spots, and maintaining the assets as those are

deployed on the ground.

3.3 Banker's Response

E-bike users generally belong to low- and middle-income families and arranging finances for individual bikes sometimes becomes difficult for these families. We interviewed 20 Executives and Managers from the banking sector to assess their perception of E-bikes financing and get an expert opinion for the financial feasibility. Currently, most commercial banks are reluctant to offer finance for an e-bike except for Meezan Bank Ltd. Habib Bank Limited only offers finance for an E-bike or E-Scooter to its employees due to fuel expenses. Habib Metro Bank operates on investment mode and do not offer loans to customers. Dubai Islamic Bank also do not go for commodity financing. Rather, it gives loans in cash. Many banks are already financing motorbikes. Most respondents agree that the State Bank of Pakistan can compel and regulate the banks to allocate resources towards clean energy consumption technologies. Only some respondents were aware of the State Bank working on the proposal for electronic vehicles and e-bikes and expectedly will notify all the banks to extend easy loans for e-bikes as a part of their environmental responsibility and the Go Green Project of the government of Pakistan.

Most of the commercial banks are offering Consumer Product financing for solar systems, but banks are doing it under the umbrella of Program based Lending. Similar lending in the case of E-bikes is possible if the government introduces a program and asks the banks to allocate resources for this clean energy initiative.

Another aspect of the low possible bank financing for e-bikes is the volume of loans per transaction which is too low that banks are least interested to take it up for business purposes. From the banker's perspective, the required documentation and protocols are similar for electric car and e-bike financing and the bank must allocate disproportionately large number of resources for e-bike financing, thus raising questions on its financial viability. In the meantime, certain developments have taken place in the policy arena, and the Ministry of Industries and Production, Government of Pakistan, has approved the "Electric Vehicle Policy - for 2 & 3 Wheelers & Heavy Commercial Vehicles" in January 2023. The respondents identified the challenges listed below for the financial inclusion of E-bike users needing finance.

- Extremely high KIBOR and interest rates.
- Issues related to the standardization of the E-bike Brands and companies.
- Availability and dealership issues.
- Ensuring registration and insurance availability.
- Low demand for the product.

4. Socio-Economic Significance of the Study

The country is facing huge financial and environmental cost due to oil imports and transport sector consumes about 80% of oil products. The burden of heavy reliance on oil for energy purposes is felt at multiple levels. For example, oil imports drain huge number of foreign reserves in payment to oil exporting countries; household budget is disturbed with petrol price hikes and low and lower middle-income families are more vulnerable. In addition, there are enormous environmental hazards associated with petroleum consumption that cause urban pollution and deteriorate air quality. The top ranking of major cities of Pakistan in the air quality index is an indicator of this fact. In this backdrop, the aim of this study is to find the potential of e-bike as a substitute for motorized cars and 2-wheelers in Pakistan.

The perception of potential users of E-bike is important to design a policy that can put in place the required infrastructure and incentivize the suppliers and consumers. The acceptance of consumers for e-bikes as a viable mode of transportation will help in reducing financial and environmental burden to the society. It will reduce congestion on roads, offer students and early career individuals a flexible mode of traveling to their educational institutes and workstations. E-bike manufacturing in the country will create new jobs and business opportunities through dealership and operational management.

5. Conclusion

This research study finds the potential for E-bike adoption in lieu of fossil fuel-based motorbikes in Pakistan's transportation sector. Urban transport sectors are in transition owing to the air quality concerns worldwide. In this background, the social benefit of E-bikes in terms of reduced carbon emissions and sustainable mobility cannot be over-emphasized. This is a qualitative exploratory study that focuses on understanding consumers' perception of e-bike use, alongside the challenges faced by suppliers, and the prospects of bank financing for E-bike consumers. In the beginning, we review many studies examining the transition from motorized modes of transportation to either bicycles or the electric vehicles and bikes. Literature also highlights different issues and bottlenecks in adopting e-bikes including built infrastructure, on-road safety regulations, and design features of E-bikes.

Pakistan is witnessing a gradual rise in private cars and motorcycles that adds to the urban pollution as well as the financial costs. Various factors such as, supportive policy and regulations and availability of consumer financing from bank at reasonably lower rates can stimulate E-bikes adoption. The study presents findings from bike users survey, supplier responses, and interviews with bankers. The responses indicate a generally positive perception for e-bikes among users in terms of satisfaction levels, driving experience, maximum speed, cost per kilometer, pollution reduction, and safety standards. However, concerns about purchase price and distance coverage remained elusive in

case of both motorbikes and E-bikes. We interviewed the manager of a prominent bike-sharing company in Pakistan, ezBike, to find the supplier response and he highlights challenges such as financial constraints, bike damage, asset management, and on ground Page 24 of 36 operations in different communities. These insights shed light on low incentives for offering e-bike sharing services especially in heterogenous communities.

Financial constraints of families are perceived as a major bottleneck by many users and availability of bank finances can accelerate the E-bike adoption among masses. We interviewed banker and find that most commercial banks in Pakistan are currently not providing finance to customers for e-bike purchases. The bankers' perception highlights that formal bank financing would not be feasible if issues related to the lack of standardized bikes and models, and e-bike registration are not resolved. In addition, customers are not likely to be attracted for e-bikes finance given the extremely high interest rates in the country unless government subsidize it. Therefore, regulatory interventions can foster financing for e-bikes that is plausible and aligned with government's environmental initiatives.

5.1 Future Recommendations

The findings underscore the potential of e-bikes in reducing the environmental footprint, easing traffic congestion, and improving the overall transportation landscape in Pakistan. Promoting e-bike adoption is pivotal in achieving SDGs related to clean energy, sustainable cities,

and climate action. Policy actions are needed to overcome challenges through advocating for regulatory support, provision of charging infrastructure at workstations and markets, regulate and standardize e-bike models, support e-bike use through strengthening the dealership networks, and facilitate affordable financing options that can increase accessibility for lower and middle-class households.

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