The Socio-Economic Impact of E-Rickshaw Adoption: A Study on Income Growth and Social Status Enhancement

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KEYWORDS	ABSTRACT
E-rickshaws (electric rickshaws), sustainable mobility, income, social status, urban transport.	This research investigates the impact of E-rickshaw adoption on the income and social status of owners in urban areas of Bihar and Jharkhand, India. Utilizing a cross-sectional research design and a sample of 368 E-rickshaw owners, the study explores various dimensions of this impact. Findings reveal a significant positive relationship between E-rickshaw adoption and income growth. Moreover, there is a notable positive connection between income growth and social status, yet the direct link between E-rickshaw adoption and social status is non-significant. Mediation analyses suggest a full mediation role of income growth in the relationship between E-rickshaw adoption and social status. The research also examines the moderating effect of education level, revealing non-significant impacts on the relationships between E-rickshaw adoption and both income growth and social status. This study contributes crucial insights into the transformative dynamics of E-rickshaw adoption, offering valuable implications for urban transportation, income generation, and societal status. ...

1. INTRODUCTION

Amidst the ever-increasing challenges of urbanization and transportation demands, electric rickshaws (E-rickshaws) emerge as a promising solution, harnessing electricity to provide a sustainable and transformative urban mobility experience. The global adoption of E-rickshaws is indicative of a significant shift in urban transportation trends, marked by a compound annual growth rate exceeding 15%, underscoring the economic viability of E-rickshaws and positioning them as attractive entrepreneurial opportunities (Biswas et al, 2019). The adoption of E-rickshaws is intricately linked to the income levels and social status of owners, presenting an entrepreneurial opportunity, particularly for those with moderate incomes (Rana, 2012). Lower upfront costs and operational expenses make E-rickshaws accessible, and government incentives further support individuals with lower income levels (Ray et al, 2020; Niti Aayog, 2017). Operating E-rickshaws not only offers a stable income, contributing to upward social mobility, but also earns owners' recognition within their communities, positively impacting their social standing (Jurg, 2019)).

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The existing literature on E-rickshaw adoption and its impact on income levels and social status reveals notable gaps, as highlighted by Bari (2021) and Priye (2021), emphasizing the need for more research on the specific socio-economic impact of E-rickshaw adoption. Khan (2020) and Eccarius (2020) further call for additional studies on the sustainability and consumer adoption of E-rickshaws, providing valuable insights into potential effects on income levels and social status. Consequently, the research gap lies in the necessity for studies that directly investigate the relationship between E-rickshaw adoption and these socio-economic factors.

With these gaps and limitations in mind, the objective of the study is to ascertain the interrelationship between adoption of E-rickshaw (AER), growth in income (GI), and social status (SS) in Bihar and Jharkhand, India. The study aims to make theoretical contributions to existing literature by assessing the interrelationship between AER, GI, and SS. Specifically, it examines the impact of AER on GI and determines whether GI mediates the relationship between AER and SS. Notably, the study addresses the limited research on the moderating role of education level in the relationships between AER and GI and AER and SS. By doing so, the research seeks to enhance understanding and highlight the role of AER in GI and SS. The research study aims to contribute to AER and enhance comprehension of the Technology Acceptance Model (TAM) proposed by Davis in 1989. TAM highlights perceived ease of use and usefulness as critical factors influencing technology adoption. The study also delves into Rational Choice Theory (RCT), suggesting individuals make decisions by evaluating costs and benefits, choosing options that maximize utility, as discussed by Browning et al. in 1999. Additionally, Social Stratification Theory (SST) is explored, examining how society is stratified based on factors like income, occupation, and education, as introduced by Parsons in 1940.

The practical implications of this research are noteworthy, offering valuable insights for policymakers and urban planners engaged in promoting sustainable transportation. By recognizing the mediating role of income growth and the moderating influence of education, policymakers can formulate more inclusive strategies that account for diverse socio-economic contexts. This study significantly advances the scholarly discourse on the socio-economic implications of electric rickshaw adoption, providing novel insights for academic research and actionable considerations for practical policy implementations

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Adoption of E-rickshaw (AER) and Growth in Income (GI)

Saxena (2019) highlights the significant opportunity for self-employment that E-rickshaws provide to uneducated and economically disadvantaged individuals, leading to a substantial generation of income. This rapid growth can be attributed to the allure of self-employment for those who migrated to cities in pursuit of livelihood opportunities. Building on this, Bari et al. (2021) delve into the income levels of E-rickshaw drivers, revealing that over half of the respondents earn a daily income ranging from INR 501 to 1000. Additionally, Biswas et al. (2019) emphasize the financial appeal of E-rickshaws as an investment, demonstrating that engaging in this mode of transportation can yield high profitability. This low-cost electric vehicle has the capacity to carry enough passengers to generate a decent income, as noted by Ghosh et al. (2021). The introduction of E-rickshaws has undoubtedly ushered in a transformative phase in urban transportation, profoundly impacting the economic well-being of their owners. Studies consistently show that E-rickshaw operators experience a marked increase in their income levels compared to their counterparts in traditional cycle rickshaws or manual labor (Marwah & Bawa, 2016; Jituri, 2018; Nambiar et al., 2019). This income surge can be attributed to several factors, including heightened operational efficiency, an expanded customer base, and the reduced physical exertion associated with electric-powered vehicles. The shift to E-rickshaws enables operators to cover longer distances in shorter time frames, resulting in higher earnings. Moreover, the perception of E-rickshaw owners as forward-thinking contributors to modernized urban transportation has led to a surge in demand for their services, further augmenting their income. This trend not only represents an economic upliftment for the owners but also underscores the potential of E-rickshaws to act as a catalyst for broader socio-economic advancement within the communities they operate (Eden, 2018). Based on the findings from the literature review, the author proposes the following hypothesis.

H1: *The adoption of E-rickshaws positively contributes to the growth in income of owners.*

2.2 Growth in Income (GI) and Social Status (SS)

The intricate relationship between income growth and social status is a multifaceted phenomenon, as highlighted by various scholars (Fershtman,1 996). Corneo & Jeanne, 2001) study underscores the pivotal role of net financial income in determining one's social class and status within a society. Building on this notion, Moav and Neeman, (2010) introduces the concept of conspicuous consumption, suggesting that individuals utilize their spending habits as a signal for their income and social standing. Paradoxically, he posits that impoverished families striving to ascend the social hierarchy through wealth accumulation often find themselves ensnared in a cycle of conspicuous consumption that hinders their escape from poverty. Pham (2005) research adds another layer to this discussion, revealing that higher household income is associated with a decrease in time spent socializing, indicating a potential trade-off between economic prosperity and social engagement. Meanwhile, Hopkins, & Kornienko, (2004) findings posit that a doubling of income significantly elevates one's general social

standing. Kawamoto, (2009) delves into the implications of rising income inequality, suggesting that it intensifies the drive for status-seeking behaviors by amplifying the rewards associated with status enhancement. Additionally, Rubin and Segal (2015) underscores the significance of relative income position in shaping individual attitudes. Levin and Bigsten (2000) provides a broader perspective, demonstrating that income inequality not only correlates with diminished social capital but also contributes to a range of societal challenges spanning from health disparities to crime rates. Even in the later stages of life, as Dollar et al. (2015) observes, the connection between status variables and income remains remarkably stable. Howarth and Kennedy (2016) further reinforces these notions, illustrating that individuals with similar income levels tend to gravitate towards each other within evolving social networks over time. Collectively, these studies emphasize the intricate interplay between income growth, consumption patterns, and social status, shedding light on the complex dynamics that shape our social and economic landscapes. Based on the literature review, the author posits the following hypothesis.

H2: *Growth in income positively enhances the social status of the owners.*

2.3 Adoption of E-rickshaw (AER) and Social Status (SS)

The emergence of electric rickshaws, or E-rickshaws, marks a significant transition in urban transportation, replacing traditional cycle rickshaws and manual labor with environmentally sustainable electric vehicles. Studies by Bari et al. (2021), Priye and Ranjan (2021), as well as Sen (2022), have highlighted that many operators of E-rickshaws come from low-income backgrounds, facing financial challenges and debt. However, this shift towards E-rickshaws has brought about positive transformations. Research by Marwah & Bawa (2016), Jituri (2018), and Nambiar et al. (2019) indicates a notable improvement in the social status of E-rickshaw owners, signifying economic empowerment and enhanced recognition. Moreover, the adoption of E-rickshaws aligns with broader environmental conservation efforts, as they produce zero emissions. This transition not only contributes to reduced air pollution but also enhances the perceived social standing of E-rickshaw owners, positioning them as eco-conscious contributors to their communities and the environment at large (Vermani et al., 2020; Khanna et al., 2018; Bari et al. 2021). The shift to E-rickshaws further redefines societal perceptions, casting operators as forward-thinking and technologically adept individuals, ultimately elevating their social status and garnering increased respect within their communities (Mondal & Saha, 2020; Marwah & Bawa, 2016). As the E-rickshaw revolution continues, it holds the promise of even greater social empowerment and economic upliftment for communities worldwide (Chandran & Brahmachari, 2015; Sharma et al., 2020). This transition is underpinned by a set of universal and culture-specific values, including reliability, safety, solidarity, competitiveness, and affordability, that make E-rickshaws socially, economically, and environmentally sustainable in their respective regions (Singh et al, 2021). Based on the review of existing literature, the author proposes the following hypothesis.

H3: *The adoption of E-rickshaws leads to a positive improvement in the social status of the owners.*

2.4 Adoption of E Rickshaw (AER), Growth in Income (GI) and Social Status (SS)

Compared to traditional cycle rickshaws, E-rickshaws offer a more efficient mode of transportation, leading to a notable increase in daily earnings. This economic empowerment, supported by studies from Saxena (2019), Ray et al. (2020), and Biswas et al. (2019), contributes significantly to the enhancement of the socio-economic status of E-rickshaw owners and their families. Additionally, the ownership and operation of an E-rickshaw necessitate a certain level of technical expertise, driving owners to acquire skills in vehicle maintenance, battery management, and electrical systems. This skill development not only enhances their proficiency as E-rickshaw operators but also equips them with versatile, transferable skills applicable in various domains. Furthermore, the entrepreneurial opportunities arising from E-rickshaw ownership, where owners hire drivers to operate their vehicles, create job openings within their communities, further fueling economic growth (Tjahjono & Bin, 2001; Choenni et al., 2001; Zaharia et al., 2004). This dual impact on income growth and skill development underscores the transformative potential of E-rickshaws in not only bolstering economic well-being but also in enhancing social standing within their respective communities. Eze (2013) suggested that income moderated perceptions of technology adoption, with cost and social influence being more crucial for high-income earners. Additionally, Patria and Erumban (2020) proposed that certain levels of technology adoption could reduce income inequality. Applying these insights, the adoption of E-rickshaws enhanced social status by mediating income growth, where reduced operational costs and entrepreneurial opportunities contributed to improved financial stability and elevated community recognition for operators. This approach aligned with the idea that income dynamics played a pivotal role in shaping the socio-economic impacts of technological innovations like E-rickshaws. Based on the literature review, the author proposes the following hypothesis.

H4: *Growth in income significantly mediates the relationship between adoption of E-rickshaw and social status.*

2.5 Role of Education (ED) on Adoption of E-rickshaw, Growth in Income, and Social Status

Education plays a pivotal moderating role in the adoption of E-rickshaws and its subsequent impact on enhancing social status. Studies have shown that individuals with higher levels of education are more likely to recognize and seize the opportunities presented by E-rickshaw ownership. Education equips them with the necessary technical know-how, problem-solving skills, and a broader understanding of market dynamics, making them better positioned to navigate the complexities

of operating an E-rickshaw (Jou et al, 2022; Campion et al, 2019). Additionally, education fosters an entrepreneurial mindset, allowing owners to explore innovative ways to maximize their earnings and expand their businesses. Moreover, education empowers E-rickshaw owners to engage with and adapt to emerging technologies and trends in the transportation sector (Schafer, 2012). This adaptability not only improves their efficiency as operators but also enhances the overall quality of service provided. It enables them to offer safer, more comfortable, and technologically advanced transportation solutions, which can lead to increased customer satisfaction and loyalty. In terms of social status, education can act as a catalyst for upward mobility. E-rickshaw owners with higher levels of education are more likely to engage in community development initiatives, actively participate in local governance, and advocate for policies that benefit their industry (Silva, 2007; Fortunato et al, 2019; Hughey, 2003). This not only elevates their own social standing but also contributes to the overall betterment of their communities (Weerts, 2015). Drawing from the existing literature, the author posits the following hypothesis.

H5: *Education level has a moderating effect on the relationship between adoption of E-rickshaw and growth in income of the owner.*

H6: *Education level has a moderating effect on the relationship between the adoption of E-rickshaw and social status of the owner.*

2.6 Conceptual Framework

A conceptual framework is introduced in Figure 1, derived from an in-depth exploration of existing literature. This model serves as a conceptual roadmap, synthesizing key insights from the reviewed literature to provide a structured foundation for understanding and addressing the subject under investigation.
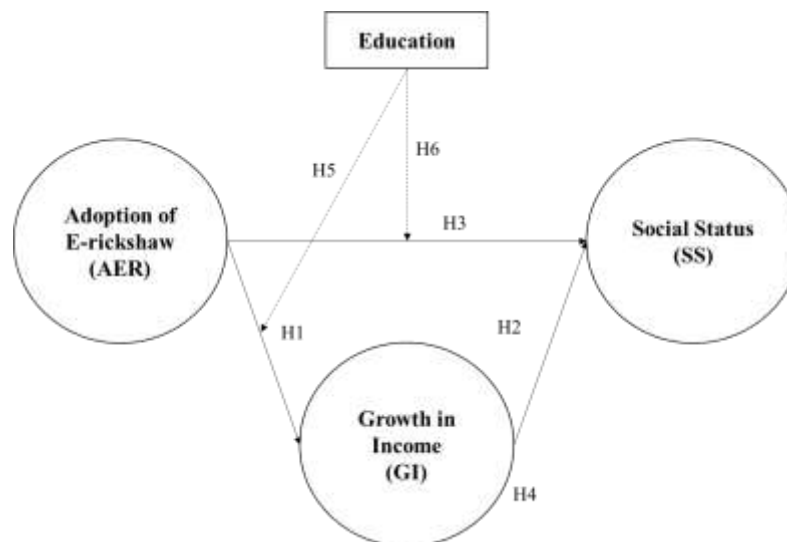

Figure 1: A conceptual framework

3. Research Methodology

The study employed a cross-sectional research design to investigate the impacts of adopting electric rickshaws on the income levels and social status of owners in urban areas of Bihar and Jharkhand, India. Convenience sampling was used to select rickshaw owners available at the stand, and data collection involved structured interviews and surveys covering socio-demographic details, E-rickshaw adoption, income levels, education, and social status. Questionnaire development for the research included adapting measures from existing literature to assess various constructs related to electric rickshaw adoption. Measurement items for adoption of e-rickshaw (AER) were derived from the "Technology Adoption Lifecycle" model (Miller, 2015) and the Net Promoter Score (Score, 2018). Items for growth in income (GI) and social status (SS) were adapted from socioeconomic status scales (Majumder, 2021).

To ensure relevance, a pilot study with 25 rickshaw owners informed modifications to survey language for clarity and appropriateness. After in-person contact and briefing about study objectives, 410 survey forms were completed. Following the removal of 42 incomplete or outlier responses, 368 valid samples remained for data analysis, resulting in an effective response rate of 90%, deemed satisfactory based on established literature (Malhotra & Grover 1998; O'Leary & Vokurka 1998; Baruch & Holtom, 2008)). The data analysis process was executed methodically through the utilization of IBM SPSS and SmartPLS 4 software. In the initial stage, confirmatory factor analysis was applied to evaluate model fit, validity, and reliability. Survey items, subject to assessment by rickshaw owners on a five-point scale, underwent meticulous scrutiny,

resulting in the exclusion of items with low factor loadings to uphold measurement quality. Subsequently, following the confirmation of acceptable model fit indices, the second stage involved the application of structural equation modeling to systematically assess hypotheses within the proposed model.

4. Analysis and Findings from the Data

4.1 Profile of E-rickshaw Owners

The Table 1 outlines key demographics of E-rickshaw owners, revealing a distinct profile within this sector. Predominantly male (96.7%), the majority falls within the 25 to 50 age range (56.8%), emphasizing the active involvement of individuals in their prime working years. Educational attainment shows that a significant portion has completed at least Matric education (60.3%). In terms of income, a notable 81.8% earn less than 25,000 Rs. monthly, indicating a prevalence of lower-income individuals in E-rickshaw ownership. Family dynamics reveal that many E-rickshaw owners support 4 to 6 dependents (48.6%), shedding light on the familial responsibilities associated with this occupation.

Table 1: Profile of E-rickshaw owners

		Frequency	Percent
Gender	Male	356	96.7
	Female	12	3.3
Age	Below 25 years	122	33.2
	25 to 50 years	209	56.8
	Above 50 years	37	10.1
Education	Non-Matric	127	34.5
	Matric	222	60.3
	Graduate	19	5.2
Monthly income	Less than 25,000 Rs.	301	81.8
	25,001 Rs. To 50,000 Rs.	62	16.8
	50,001 to 100,000 Rs.	5	1.4
Dependents	Up to 3	136	37.0
	4-6	179	48.6
	More than 6	53	14.4

Note: Total Sample size=368

4.2 Common Method Bias

In evaluating common method bias, the current study utilized Variance Inflation Factor (VIF) values within the inner model. It is noteworthy that all VIF values (see Table 2) in this study are below 3.33, indicating an absence of common method bias in the model (Kock, 2015).

Table 2: Collinearity statistics (inner model)

	VIF
AER -> GI	1.01
AER -> SS	1.54
Educaton -> GI	1.01
Educaton -> SS	1.01

GI -> SS	1.528
Educaton x AER -> GI	1.02
Educaton x AER -> SS	1.02

Note: AER =Adoption of E-rickshaw, GI= Growth in income, SS= Social status, VIF = Variance Inflation Factor
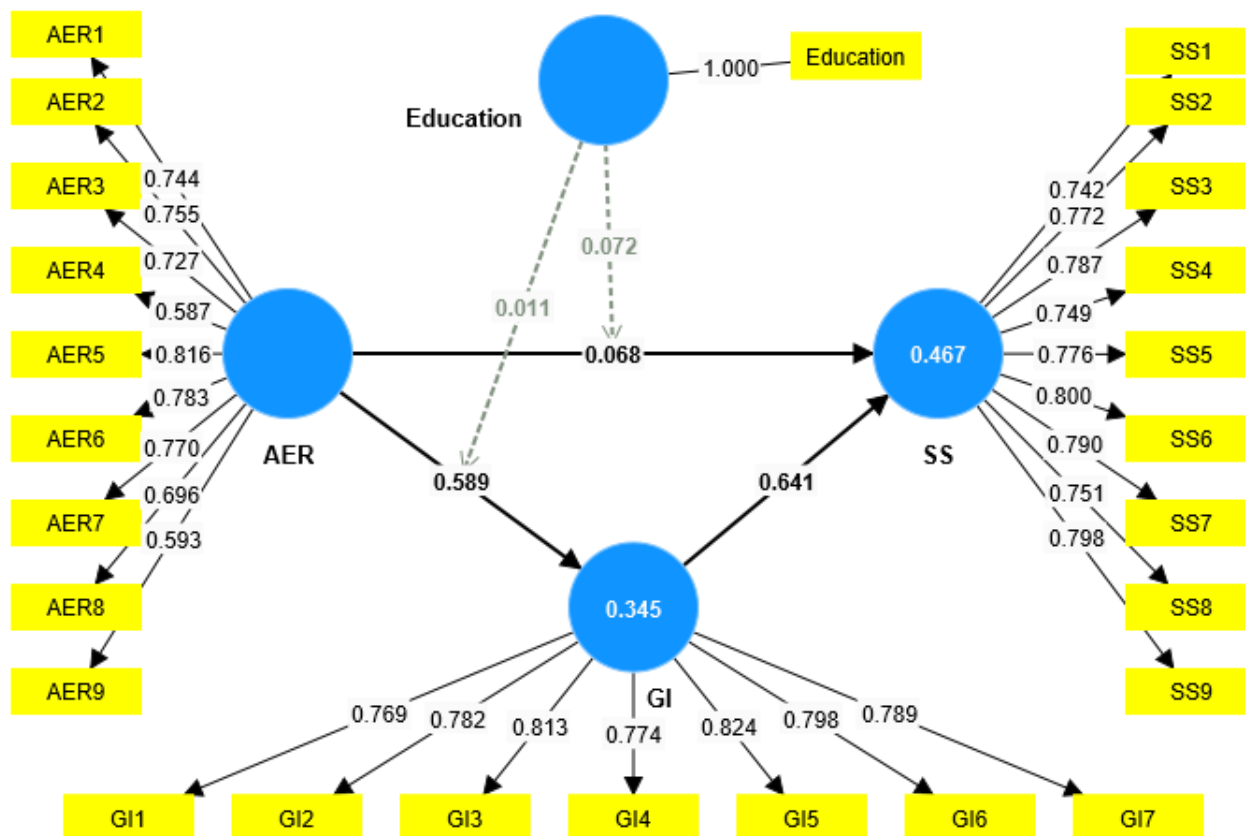
4.3 Assessment of Measurement Model

Figure 2: Measurement model

The evaluation of the measurement model aimed to establish the reliability and validity of the constructs (see figure 2). All items in the model exhibited factor loadings surpassing the minimum acceptable value of 0.50, as recommended by Hair et al (2010). While a factor loading exceeding 0.7 is preferable (Vinzi, et al, 2010), the current study retained item AER4 (factor loading = 0.587), AER8 (factor loading = 0.696) and AER9 (factor loading = 0.593) because of its significant contribution to the enhancement of composite reliability and AVE (Hair et al ,2016). Moreover, there were no issues of multicollinearity (see Table 3) in the model, as all values (VIF) were below 5 (Hair et al, 2011) or even below 3.3 (Diamantopoulos & Siguaw, 2006).

Table 3: Constructs and measurement items

Construct	Code	Measurement items
Adoption of E-rickshaw (AER)	**AER1**	I believe that electric rickshaws are a cost-effective alternative to traditional rickshaws in the long run.
	AER2	I believe that the maintenance and operating costs of electric rickshaws are lower than traditional rickshaws.

	AER3	I would be more inclined to use an electric rickshaw for short-distance travel over a traditional rickshaw.
	AER4	The availability of charging infrastructure is a crucial factor for the successful adoption of electric rickshaws.
	AER5	The general public's awareness and acceptance of electric rickshaws has played a crucial role in their widespread adoption.
	AER6	Electric rickshaws have the potential to create job opportunities for drivers in our community.
	AER7	I believe that the adoption of electric rickshaws can help reduce air pollution in our city.
	AER8	I am aware of the benefits of electric rickshaws in terms of reduced noise pollution.
	AER9	I would be willing to pay a slightly higher fare for a ride in an electric rickshaw to support environmental sustainability.
Growth in Income (GI)	GI1	My income has increased significantly after adoption of electric rickshaw (ER).
	GI2	I believe that overall, those who adopted ER are experiencing income growth.
	GI3	Economic conditions of my family has improved, leading to prosperity in my family.
	GI4	I am optimistic about the future and expect my income to continue to grow.
	GI5	I feel financially secure and believe that income growth is attainable for me.
	GI6	I find that I can now comfortably handle my living expenses.
	GI7	The growth in my income has provided me with greater access to resources and opportunities.
Social Status (SS)	SS1	My financial well-being significantly impacts my social standing.
	SS2	The nature of my job or profession greatly influences my perceived social status.
	SS3	My social connections and networks are expanding.
	SS4	I've seen a rise in invitations to social events and gatherings.
	SS5	I've noticed that people are more open and responsive when I approach them.
	SS6	My involvement in philanthropic activities has allowed me to elevate my social standing.
	SS7	I have noticed a shift in my demeanor and behavior, and this change is impacting how people perceive me compared to before.
	SS8	Possession of material goods, such as luxury items or a high-end home has improved my social status.

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SS9	Participation in community or social events has positively influenced my social standing.	

Table 4: Collinearity statistics (outer model)

Measurement items	VIF	Measurement items	VIF	Measurement items	VIF
AER1	2.575	GI1	2.308	SS1	2.338
AER2	2.572	GI2	2.335	SS2	2.632
AER3	1.964	GI3	2.315	SS3	2.244
AER4	1.487	GI4	1.958	SS4	1.966
AER5	2.684	GI5	2.458	SS5	2.264
AER6	2.46	GI6	2.557	SS6	2.332
AER7	2.465	GI7	2.285	SS7	2.315
AER8	2.033			SS8	2.199
AER9	1.428			SS9	2.511

Note: AER =Adoption of E-rickshaw, GI= Growth in income, SS= Social status, VIF = Variance Inflation Factor

4.3.1 Construct Reliability and Validity

The Table 5 displays robust reliability and validity metrics for the investigated constructs. Notably, Cronbach's alpha values for Constructs AER, GI, and SS were 0.883, 0.902, and 0.916, respectively, indicating high internal consistency within each construct. Supporting the reliability aspect, composite reliability (rho_c) values stood at 0.907, 0.922, and 0.931 for AER, GI, and SS, surpassing the recommended threshold of 0.8 (Hair et al., 2021). These values underscore the constructs' consistent and reliable measurement. In terms of convergent validity, the average variance extracted (AVE) values were 0.523, 0.629, and 0.599 for AER, GI, and SS, respectively. All AVE values exceeded the conventional threshold of 0.5, indicating that a significant proportion of the variance within each construct was effectively captured by its measurement items. This highlights the constructs' robust convergent validity and their ability to measure the intended constructs accurately.

Table 5: Construct reliability and validity

	Cronbach's alpha	Composite reliability (rho_c)	Average variance extracted (AVE)
AER	0.883	0.907	0.523
GI	0.902	0.922	0.629
SS	0.916	0.931	0.599

Note: AER =Adoption of E-rickshaw, GI= Growth in income, SS= Social status, AVE = Average variance extracted

4.3.2 Discriminant Validity

The examination of discriminant validity for the constructs utilized the Heterotrait–Monotrait ratio (HTMT) criterion, deemed more reliable than the widely employed Fornell–Larcker Criteria (Neneh, 2019; Henseler et al., 2015). Adhering to the conservative criterion of an HTMT value of 0.85, the highest value recorded in Table 6 was 0.741, well below the specified threshold. This observation, consistent with the criteria set by Verkijika and De Wet (2018) and Henseler et al. (2015), affirms the discriminant validity of the constructs.

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Table 6: Discriminant validity (using HTMT)

	AER	Education	GI	SS
Education	0.046			
GI	0.656	0.027		
SS	0.483	0.029	0.741	
Education x AER	0.102	0.098	0.054	0.043

Note: AER =Adoption of E-rickshaw, GI= Growth in income, SS= Social status, AVE = Average variance extracted
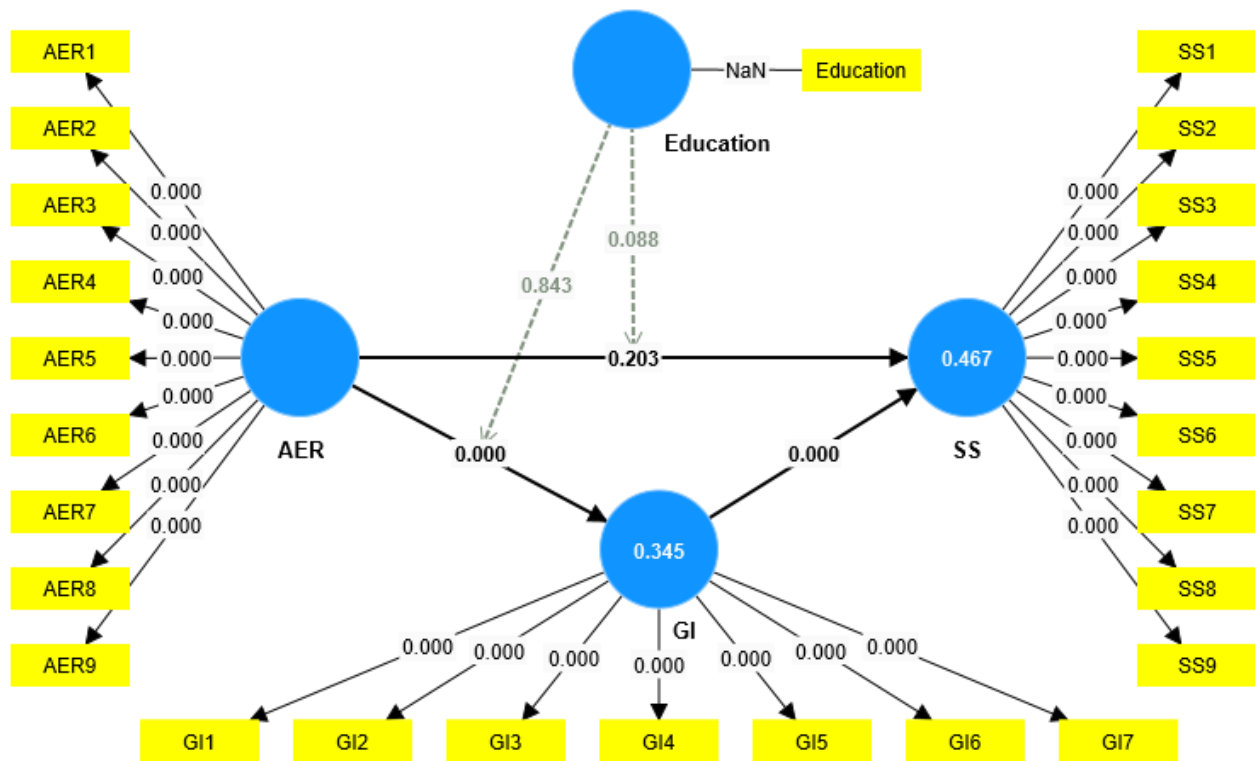
4.4 Assessment of Structural Model

Figure 3: Structural model

4.4.1 Assessing R² Values

The R^2 metric, indicating variance explained within endogenous constructs, underscores the model's explanatory power (Hair et al., 2013; Shmueli & Koppius, 2011). The adjusted R^2 values for Growth in Income (GI) and Social Status (SS) in Table 7, 0.34 (week) and 0.461 (week), respectively (Henseler et al., 2009; Hair et al., 2011), affirm the predictive relevance of the structural model in capturing substantial variability in these constructs.

4.4.2 Assessing Q² Values

The PLSpredict analysis (Shmueli et al. 2016), based on the Stone-Geisser Q2 values (Geisser, 1974; Stone, 1974) indicates that the PLS-path model in this study exhibits predictive accuracy for growth in income (GI) and social status (SS). Q2 values of 0.326 for GI and 0.173 for SS (see Table 7) surpass the critical threshold of zero, meeting the criterion for predictive accuracy. these Q2 values suggest a small to moderate level of predictive relevance for both constructs.

Table 7: Explanatory power

	R^2 adjusted	Q^2predict
GI	0.345	0.326
SS	0.467	0.173

Note: GI= Growth in income, SS= Social status

4.4.3 Assessing f^2 Values

The f^2 size effect is a measure to evaluate change in the coefficient of determination (R^2) value when a specified exogenous variable is omitted from the model. Table 8 presents a summary of the f^2 size effects, revealing distinct patterns in the relationships between variables. The f^2 size effect is large (0.525) for AER on GI, and small (0.006) on SS whereas f^2 size effect is large (0.504) for GI on SS (Cohen, 1988).

Table 8: f^2 Values

	f-square	Effect size
AER -> GI	0.525	Large
AER -> SS	0.006	Small
GI -> SS	0.504	Large

Note: AER =Adoption of E-rickshaw, GI= Growth in income, SS= Social status

4.4.4 Model fit

The Goodness of Fit (GoF) is a comprehensive measure of model fit in PLS-SEM. Introduced by Henseler et al. (2015), the standardized root mean square residual (SRMR) serves as an indicator for assessing GoF in a path model. In this study, the SRMR and normed fit index (NFI) values for the model are 0.063 and 0.791, respectively. With the SRMR value being less than 0.08, it confirms that the model exhibits a good fit. Additionally, the NFI value, approaching 1, indicates an even more robust fit.

4.5 Hypotheses Testing

The study examined various hypothesized relationships, and the results were outlined in Table 9. The data revealed a significant positive relationship between the adoption of E-rickshaws (AER) and the growth in income (GI) of owners (β = 0.589, t = 14.920, p < 0.001), providing support for H1. The data also showed a significant positive relationship between the growth in income (GI) of owners and the social status (SS) of the owners (β = 0.641, t = 14.205, p < 0.001), supporting H2. However, the data indicated a non-significant positive relationship between the adoption of E-rickshaws (AER) and the social status (SS) of the owners (β = 0.068, t = 1.274, p = 0.203), providing no support for H3.

Table 9: Direct relationships

Hypotheses		β	σ	t	p	Decision
H1	AER -> GI	0.589	0.039	14.920	0.000	Supported
H2	GI -> SS	0.641	0.045	14.205	0.000	Supported
H3	AER -> SS	0.068	0.053	1.274	0.203	Not supported

Note: β = Beta Coefficient, σ = Standard Deviation, t = T-Statistics, p = Probability Values, AER =Adoption of E-rickshaw, GI= Growth in income, SS= Social status

4.6 Mediation

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The study conducted mediation analyses to investigate potential mediating roles of Growth in Income (GI) in the relationship between the adoption of E-rickshaws (AER) and social status (SS). The results in Table 10 revealed a significant indirect effect of AER on SS through GI (β = 0.377, t = 9.528, p < 0.001). The total effect of AER on SS was significant (β = 0.445, t = 9.609, p < 0.001). With the inclusion of the mediator, the effect of AER on SS became insignificant (β = 0.068, t = 1.274, p = 0.203). This demonstrated an indirect-only full mediation role of GI in the relationship between AER and SS. Therefore, H4 was supported.

Table 10: Mediation analysis

Hypothesis	Total effect			Direct effect			Indirect effect			
	AER -> SS			AER -> SS			AER -> GI -> SS			
H4	β	t	p	β	t	p	β	t	p	Decision
	0.445	9.609	0	0.068	1.274	0.203	0.377	9.528	0.000	Supported

Note: β = Beta Coefficient, t = T-Statistics, p = Probability Values, AER =Adoption of E-rickshaw, GI= Growth in income, SS= Social status

4.7 Moderation Analysis

The analysis extensively examined the significance of the moderating effect, with detailed findings presented in Table 11. The results indicated a positive yet statistically insignificant moderating impact of education (ED) on the relationship between the adoption of E-rickshaws (AER) and Growth in Income (GI) (β= 0.011, t = 0.198, p = 0.843), thereby failing to provide support for Hypothesis 5. Additionally, the investigation revealed a positive and statistically insignificant moderating impact of education (ED) on the relationship between AER and Social Status (SS) (β= 0.072, t = 1.706, p = 0.088), indicating that Hypothesis 6 was also not supported.

Table 11: Moderation analysis

Hypotheses		β	t	p	Decision
H5	Education x AER -> GI	0.011	0.198	0.843	Not supported
H6	Education x AER -> SS	0.072	1.706	0.088	Not supported

Note: β = β Coefficient, t = T statistics, p = Probability value, AER =Adoption of E-rickshaw, GI= Growth in income, SS= Social status

5. Discussion

The empirical findings of this study offer valuable insights into the relationships between E-rickshaw adoption, income growth, social status, and the moderating role of education. These findings contribute to the existing literature on the socio-economic impact of E-rickshaws, shedding light on the nuanced dynamics within this sector.

The first hypothesis, which posits that the adoption of E-rickshaws positively contributes to the growth in income of owners (H1), receives robust support from the data. The statistical analysis reveals a significant positive relationship between E-rickshaw adoption and income growth, indicating that individuals who adopt E-rickshaws experience a notable increase in their income levels. This aligns with the literature's emphasis on the financial appeal of E-rickshaws as a mode of transportation that can yield high profitability (Biswas et al., 2019) and contribute to a substantial generation of income, particularly for uneducated and economically disadvantaged individuals (Saxena, 2019).

The second hypothesis, suggesting that growth in income positively enhances the social status of E-rickshaw owners (H2), is strongly supported by the empirical findings. The data reveal a significant positive relationship between income growth and social status, indicating that as individuals experience an increase in income, their social status also improves. This is consistent with the broader literature highlighting the intricate interplay between income growth, consumption patterns, and social status (Fershtman, 1996; Corneo & Jeanne, 2001; Moav and Neeman, 2010). It suggests that the economic empowerment resulting from E-rickshaw ownership contributes to an enhanced social standing among the owners.

The third hypothesis, asserting that the adoption of E-rickshaws leads to a positive improvement in the social status of owners (H3), is not supported by the empirical findings. The data indicate a non-significant positive relationship between E-rickshaw adoption and social status. While the literature review suggested positive transformations in the social status of E-rickshaw owners (Marwah & Bawa, 2016); Jituri, 2018; Nambiar et al., 2019), the empirical results indicate that the direct relationship between E-rickshaw adoption and social status is not statistically significant.

The fourth hypothesis introduces the mediating role of growth in income in the relationship between E-rickshaw adoption and social status (H4). The mediation analysis provides compelling evidence supporting this hypothesis. The results reveal a significant indirect effect of E-rickshaw adoption on social status through income growth. This suggests that the economic empowerment derived from E-rickshaw ownership plays a crucial mediating role in shaping the socio-economic status of owners and their families (Eze, 2013; Patria & Erumban, 2020).

Hypotheses H5 & H6, which propose that education level moderates the relationship between E-rickshaw adoption and both income growth and social status, do not receive statistically significant support in the empirical findings. This suggests that, in the context of this study, education level does not significantly influence how E-rickshaw adoption affects income growth or social status.

The findings of this study affirm the positive impact of E-rickshaw adoption on income growth, supporting the notion that E-rickshaws contribute significantly to the financial well-being of their owners. The study also underscores the importance of income growth in enhancing the social status of E-rickshaw owners. However, while the adoption of E-rickshaws may bring about positive transformations in social status indirectly through income growth, the direct relationship between E-rickshaw adoption and social status is not statistically significant. Additionally, the study suggests that the moderating role of education, while conceptually valid (Jou et al, 2022; Campion et al, 2019), may not be statistically significant in the examined context. These findings contribute nuanced insights to the literature on E-rickshaws and open avenues for further exploration and refinement of theoretical frameworks in the study of their socio-economic impact.

6. Practical Implications

The study's practical implications are manifold and extend across various domains. Entrepreneurs and policymakers can leverage the observed positive correlation between E-rickshaw adoption and income growth to inform targeted support programs. Financial institutions are positioned to design customized financial services that align with the unique needs of E-rickshaw owners, promoting economic stability and growth within the sector. Policymakers, in collaboration with environmental advocates, can capitalize on the environmentally sustainable nature of E-rickshaws to develop campaigns that enhance their positive image, potentially expanding market demand. Community developers and NGOs have an opportunity to integrate E-rickshaw owners into broader community development initiatives, fostering holistic well-being. Educational institutions can play a crucial role by tailoring programs to enhance the technical skills of individuals in the E-rickshaw sector, contributing to improved efficiency and service quality. Public awareness campaigns are essential for dispelling negative stereotypes and emphasizing the positive impact of E-rickshaws on both income and the environment. Continuous research efforts are vital for adapting strategies to the evolving dynamics of the E-rickshaw sector. Embracing these practical implications collectively paves the way for harnessing the full potential of E-rickshaws as agents of socio-economic transformation, fostering sustainable and inclusive growth.

7. Conclusion, Limitations and Future Research

This study sheds light on the transformative impact of E-rickshaw adoption on the economic well-being and social status of owners. The findings support the first hypothesis, highlighting a positive correlation between the adoption of E-rickshaws and the growth in income. The literature review underscores the intricate relationship between income growth and social status, providing the basis for the second hypothesis, which is also supported. The positive transformations observed in E-rickshaw owners' social status are attributed to factors such as increased income, improved operational efficiency, and a shift towards environmentally sustainable transportation. Moreover, the study identifies the mediating role of income growth in the relationship between E-rickshaw adoption and social status, affirming the fourth hypothesis. The dual impact of increased income and skill development positions E-rickshaw owners as not only economically empowered but also as contributors to job creation and community development. The moderating effect of education, however, is not statistically significant, suggesting that educational levels do not significantly influence the relationships examined.

This study, despite offering valuable insights, has notable limitations. The cross-sectional design hinders the establishment of causal relationships. Sample size limitations impact the generalizability of findings, suggesting a need for larger and more diverse samples. Geographical focus on a specific region (state of Bihar and Jharkhand, India) restricts applicability to different contexts, emphasizing the importance of diverse geographic representation.

Future research endeavors should explore the broader societal impact of E-rickshaw adoption, including environmental implications and the evolving role of E-rickshaw owners in community development. Longitudinal studies are encouraged to capture the sustainability of the observed transformations over extended periods. Qualitative investigations could uncover

the socio-cultural factors influencing the perceived social status of E-rickshaw owners. Furthermore, research exploring the impact of regulatory policies on the E-rickshaw sector and the effectiveness of support programs for owners could contribute to informed policy recommendations

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