

RESIDENTS' PERCEIVED SUSTAINABILITY IMPACT ASSESSMENT OF THE NORTH-SOUTH RAILWAY PROJECT: THE CASE OF MALOLOS, BULACAN

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Abstract

This study used a quantitative approach to assess the perception of the residents regarding the construction of North-South Railways Project (NSRP), and how it will sustainably affect the environment. It utilized a survey questionnaire that is collected from the chosen respondents. The study is guided by the Triple Bottom Line Theory which evaluates the three pillars of sustainability, such as the economic, social, and environmental challenges that clearly define the key transportation issue affecting the community of Malolos, Bulacan. Demographic profiles were also determined such as age, gender, employment status, educational attainment, and years of residency. The statistical methods such as ANOVA were used to determine whether there is a significant difference in the perceptions of the respondents in sustainability when they are grouped according to profile. The result of this research could be valuable to people as it analyzes the numerous benefits of NSRP to ease the life of commuters as well as reduce the cost of transportation which positively impacts the economy and maximize the resources from the environment that could result in a better quality of life.

Keywords: Innovative Technology, Social Media, and Technical Adaptations, Community Sustainability, Business and Management.

Introduction

As we live in a dynamic and turbulent global world, continuous innovation has been imperative to survive and improve the quality of living. The government focuses on finding new ways and proactive approaches that help shape the future where people can enjoy the highest quality of life. The ultimate purpose of innovation is to overcome old structures, modes of thinking and embrace new technologies and ideas. Urban areas experience an imbalanced development and strong rivalry for resources as a result of the world's population's rapid increase and urban developments. Motorized transportation is crucial for the exchange of commodities and people, as well as for optimizing business operations.

One of the most common problems on the road is traffic congestion caused by heavy motor vehicles such as trailers, mobile cranes, and buses. Considering that the Philippines has the 11th-largest

passenger car sales among the Asia-Pacific countries in 2020. Traffic congestion has been a serious and worsening problem in our country. Urban traffic increases travel costs and restricts the locations that can be accessed for services and employment. If this issue of traffic congestion isn't addressed, it will not only affect the productivity of a project but might also affect the competitiveness of a country.

Given that Bulacan has the highest rate of population growth in Central Luzon, most of these people are using public transportation as part of their daily lives, whether it's for accessing essential services or traveling from and to work. As a result of this growing population and the increasing adverse impact of public transportation on our ecosystem, the Philippines' government laid out North-South Railway Project which is a 163-kilometer urban rail transit system that is designed to improve accessibility between Central Luzon and

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CALABARZON, providing more environmental friendly transportation, and cutting down the travel time of the commuters. In addition, NSCR Malolos-Manila has a total length of 38 kilometers and costs PHP 149.13 billion. This railway was designed to connect Tutuban (Manila) and Malolos City, Bulacan.

The primary objective of this study is to ascertain how the people of Malolos City, Bulacan, perceive the project's sustainability impact, which incorporates its economic, environmental, and social effects.

Theoretical Framework

The study is supported by the triple bottom line approach which explains the concept of sustainability as a possible long-term strategy for companies and explains how to measure a business's success into three main parts which are profit, people, and the planet. The Triple Bottom Line Theory's conceptual framework significantly influences the researcher's study of developing sustainable transportation. As stated in the study of Okland, Olsson and Venstad, (2021), the triple bottom line, often known as the three pillars, offers a framework for evaluating an organization's performance not only from an economic but also from a social and environmental standpoint. Every aspect of sustainability will be impacted and utilized. First, with the social dimension referring to

the residents of Malolos, Bulacan, who may be able to contribute to the development of society based on their perspective and how they will be impacted by the aforementioned project. It could help to determine the improvement of cultural exchange, which is essential for social cohesiveness, as well as a more skilled and diversified workforce. The Utilization of North-South Railways for economic dimension may encourage sensible consumption while accelerating urbanization and population expansion. TBL theory assesses that the researchers' study can improve access to employment as well as fostering a more inclusive and egalitarian society. According to The World Bank (2017), since the economic slump of 2015, consumers have been more concerned about economic sustainability due to the threat it poses to financial stability and, subsequently, jobs.

The last component is the environmental dimension, which deals with how the North-South Railway Project will have an ecological impact as well as how alternative fuels will be used, such as hydrogen and solar electricity that supports the need to use renewable energy more frequently. Having sustainable growth in business operations is how firms can succeed in overcoming global difficulties (Carroll et al., 2021). The theoretical underpinning of this study is that a company's competitive advantage is based on how much green innovation it integrates into its initiatives.

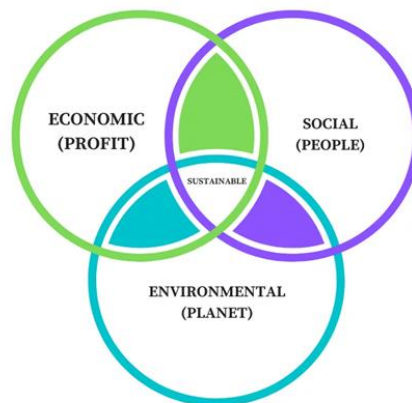
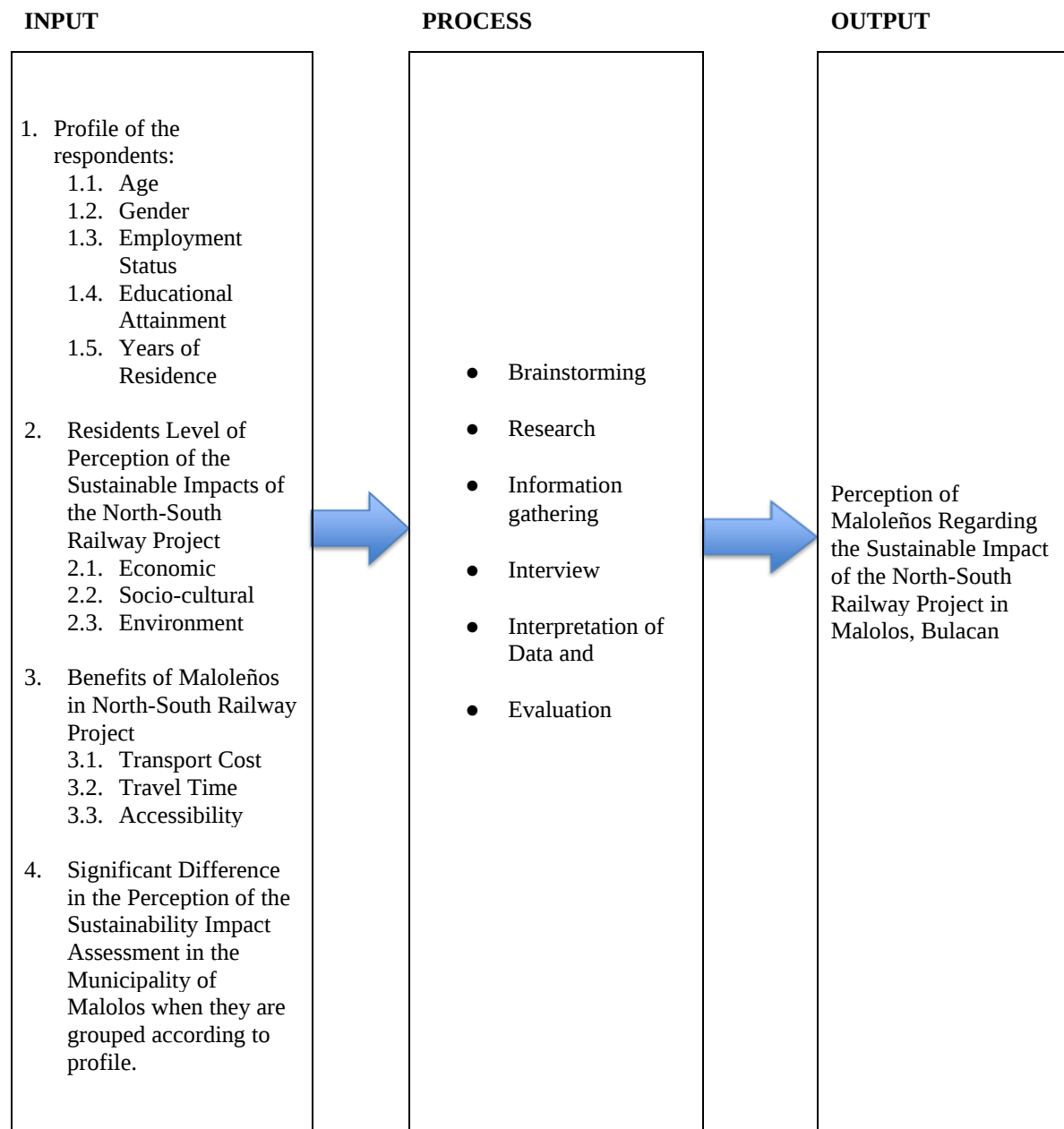


Figure 1: Theoretical Framework

Conceptual Framework

The framework below shows the IPO model. The input includes the profile of the respondents; residents level of perception of the sustainable impacts of the North-South Railway Project; the benefits of Maloleños in the North-South Railways Project and the significant difference in the

perception of the sustainable impact assessment in the Municipality of Malolos when they are grouped according to profile. The process input includes brainstorming, research, information gathering, interview, interpretation of data and evaluation. While the output is the perception of Maloleños regarding the sustainable impact of the North-South Railway Project in Malolos, Bulacan.



Statement of the Problem

This study aims to determine Maloleños' perception regarding the sustainable impact of the North-South Railway Project in Malolos, Bulacan.

Specifically, it sought to answer the following questions:

1. What is the profile of the respondents in terms of:
 - 1.1. Age
 - 1.2. Gender
 - 1.3. Employment Status
 - 1.4. Educational Attainment
 - 1.5. Years of Residence
2. What are the residents' levels of perception of the sustainable impacts of the North-South

Railway Project in terms of:

- 2.1. Economic
- 2.2. Socio-cultural
- 2.3. Environmental
3. How does the North-South Railway Project will benefit Maloleños' in terms of:
 - 3.1. Transport Cost
 - 3.2. Travel Time
 - 3.3. Accessibility
4. Is there a significant difference in the perception of sustainability impact assessment in the Municipality of Malolos when they are grouped according to profile?
5. What recommendations may be considered to further improve the sustainability of transportation?

Scope and Delimitation

The study sought to examine local residents' perceptions of the North-South Railway Project's economic, social, and environmental impacts. The data are collected from 100 local residents in the Municipality of Malolos in order to determine the residents' perceptions of the North-South Railway Project and its long-term impacts. In order to assure the manageability of the collected data, the respondents will be given one specific questionnaire prepared by the researchers. The study was conducted from July-December 2022.

Methodology

Research Design

The researchers adopted a strict standard for evaluative, descriptive, and quantitative research design. A quantitative research focuses on gathering and analyzing numerical information about individuals or phenomena across groups of people. The researchers believed that this quantitative-descriptive research methodology is appropriate for identifying and providing answers to the study because it aimed to gather direct feedback on the suggested study and critically assess it.

Participants/Respondents of the Study

The respondents for this study were the local residents aged below 18 to 50 years old and above who have lived less than a year or more than a year within the vicinity of Malolos, Bulacan. The sample size of the respondents in Malolos, Bulacan is exactly 100 local residents.

Instrument/s of the Study

The researchers use survey questionnaires to gather all of the quantitative data required for the study. The researchers created their own questionnaire in the form of a Likert scale to answer all of the particular issues provided in the problem statement. Some of the statements were also formed based on the readings of published and unpublished thesis that were relevant to the study. The first part includes the personal information of the respondents.

The second part of the research instrument entitled "Sustainability Impact Assessment" contains statements about resident's perceptions of the sustainable impacts of the North-South Railway Project. This part is composed of three sections of 5-item Likert scales which allows the respondents to express how much they agree or disagree with particular statements. The instrument was structured in the modified checklist, on a 4 - point scale, ranging from "strongly agree" (4), through "agree" (3), disagree (2), to "strongly disagree" (1). The three sections are economic, socio-cultural, and environmental impacts of the North-South Railway Project.

The third part of the research instrument is about the benefits of the North-South Railway Project to the local residents of Malolos, Bulacan. This part also includes three sections of 5-item Likert scales about the transport cost, travel time, and accessibility. The last part contains recommendations of the respondents on how to improve the sustainability of transportation.

Data Collection and Analysis

The researchers used appropriate statistical techniques to analyze, evaluate, and interpret the data that collected from the survey. Thus, the following statistical tools were used in the analysis of data frequency and percentage, weighted mean and standard deviation, and Analysis of Variance (ANOVA).

Ethical Considerations

Ethical standards ensure the privacy and confidentiality of all information collected for this study. The researchers indicated that all information, thoughts, views, and opinions would be kept strictly confidential and limited to this research. The researchers assured sufficient confidentiality of data collected under the Data Privacy Act of 2012, or Republic Act No. 10173. The researchers created an informed cover letter between the researchers and the respondents, addressing solely the research topic and its constraints; it acts as full consent prior to the study.

Results and Discussion

Demographic Profile

SOP 1: What is the profile of the respondents in terms of age, gender, employment status, educational attainment and years of residency?

The table below shows that, the majority of the respondents are within the age of 18-29 years with a frequency of 48 or 48.00 percent, while 10 or 10.00 percent are within the age bracket of below 18 years, same as the age bracket of 40-49 years. This implies that the majority of the respondents in Malolos, Bulacan are in their early adulthood period.

As gleaned on the above table, 33 or 33.00 percent are students, while 9 or 9.00 percent are government and unemployed. This implies that the majority of the respondents in Malolos, Bulacan based on their employment status are mostly students.

As observed on the table below, 50 or 50.00 percent are Bachelor's degree in college, while 2 or 2.00 percent are elementary. This implies that the majority of the respondents in Malolos, Bulacan in terms of educational attainment are mostly Bachelor's Degree in college.

Table 1: Frequency Distribution Table of the Respondents in terms of Age and Employment Status

AGE	FREQUENCY	PERCENTAGE (%)
Below 18	10	10.00%
18-29	48	48.00%
30-39	16	16.00%
40-49	10	10.00%
50 and above	16	16.00%
TOTAL	100	100.00%

EMPLOYMENT STATUS	FREQUENCY	PERCENTAGE (%)
Student	33	33.00%
Employed	20	20.00%
Self-Employed	18	18.00%
Government	9	9.00%
Private	11	11.00%
Unemployed	9	9.00%
TOTAL	100	100.00%

As shown in the table below, 46 or 46.00 percent have been residing for over 10 years, while 9 or 9.00 percent have been residing in Malolos for almost a year. This implies that the majority of the

respondents in Malolos, Bulacan are residing for a long period of time and has is credible enough to answer the survey questionnaire.

Table 2: Frequency Distribution Table of the Respondents in terms of Educational Attainment and Years of Residency

EDUCATIONAL ATTAINMENT	FREQUENCY	PERCENTAGE (%)
Masteral Graduate	8	8.00%
Bachelors Degree	50	50.00%
Undergraduate	23	23.00%
Technical Vocational	8	8.00%
Secondary	9	9.00%
Elementary	2	2.00%
TOTAL	100	100.00%

YEARS OF RESIDENCY	FREQUENCY	PERCENTAGE (%)
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Below 1 year	9	9.00%
1 year to 5 years	24	24.00%
5 years to 10 years	21	21.00%
Above 10 years	46	46.00%
TOTAL	100	100.00%

SOP 2: What are the residents' levels of perception of the sustainable impacts of the North-South Railway Project in terms of economic, socio-cultural, and environmental?

As shown in Table 3, "The railway project will help the economy grow by increasing investment, development, and infrastructure." have the highest mean of 3.46 with the standard deviation of .72 or "Strongly Agree", while, "The railway project will alleviate road traffic congestion and shorten the

travel time of commuters." has the lowest mean of 3.30 with standard deviation of .77 or "Strongly Agree". The grand mean is 3.36 with 0.526 standard deviation or "Strongly Agree". This means that the respondents in Malolos, Bulacan are aware that the North-South Railway can gain huge investment, infrastructure and development to help the economy of Malolos to grow. Moreover, the respondents consider that the railway project can give them fast access to their destinations and job opportunities.

Table 3: Mean and Standard Deviation of Level of Perception on Economic Impacts of North-South Railway Project

ECONOMIC IMPACT	MEAN	STANDARD DEVIATION	INTERPRETATION
1. The railway project will help the economy grow by increasing investment, development, and infrastructure.	3.46	.72	Strongly Agree
2. The railway project will increase employment opportunities in Malolos, Bulacan.	3.32	.66	Strongly Agree
3. The railway project will create new business opportunities.	3.37	.66	Strongly Agree
4. The railway project will provide revenue to the local government.	3.33	.68	Strongly Agree
5. The railway project will alleviate road traffic congestion and shorten the travel time of commuters.	3.30	.77	Strongly Agree
Grand Mean	3.36	0.526	Strongly Agree

In the related literature, it explains that a country's economic growth and development benefit from both the direct and indirect effects of transportation infrastructure. These effects may also increase corporate investment, leading to more job opportunities (Yasir Tariq Mohmand, Aihu Wang, and Abubakr Saeed, 2017).

As reflected on the table 4, "The railway project will improve the accessibility of the local residents to employment opportunities, education, and social services." has the highest mean of 3.42 with the

standard deviation of .62 or "Strongly Agree", while "The railway project will cause conflict and disturbance to populations living near the construction site." has the lowest mean of 2.78 with the standard deviation of .85 or "Agree". The grand mean has an average of 3.19 with standard deviation of 0.487 or "Agree".

This implies that the majority of the respondents are considering the North-South railway project will lead them to an easy access for employment opportunities, education and social services. As

similar to the study of Chamseddine & Boubkr (2020) about the urban transport crisis in Casablanca, the findings of this study identified an issue with accessibility whereas households without a car struggle to gain access to better employment

opportunities, education, and other services. Therefore, the infrastructure system is crucial in order to increase the locals' access to social services, education, and employment possibilities.

Table 4: Mean and Standard Deviation of Level of Perception on Socio-Cultural Impacts of North-South Railway Project

SOCIO-CULTURAL IMPACT	MEAN	STANDARD DEVIATION	INTERPRETATION
1. The railway project will provide high-speed movement or high mobility, enabling commuters to travel to different destinations around metropolitan areas efficiently.	3.31	.73	Strongly Agree
2. The railway project has the potential to affect the quality of life, health, and safety of the local residents.	3.10	.77	Agree
3. The railway project will cause conflict and disturbance to populations living near the construction site.	2.78	.85	Agree
4. The railway project will improve the accessibility of the local residents to employment opportunities, education, and social services.	3.42	.62	Strongly Agree
5. The railway project is considered to be more cost-effective than road transport.	3.33	.68	Strongly Agree
Grand Mean	3.19	0.487	Agree

As seen on the Table 5, “The railway project creates less air pollution than road transportation such as jeepneys, buses, and other motor vehicles.” has the highest mean of 3.24 with the standard deviation of .64 or “Strongly Agree”, while, “The railway project can lead to destruction and loss of natural ecosystems (e.g. disrupt local communities and habitats, etc.)” has the lowest mean of 2.84 with standard deviation of .90 or “Agree”.

The grand mean is 3.04 with 0.440 standard deviation or “Strongly Agree”. This data implies that the majority of respondents are aware of the

environmental benefits of the railway project, since it produces less air pollution than other public transportation but still has the potential to harm the ecosystem. Rail transport is considered to be a more sustainable transportation infrastructure that promotes energy efficiency on fossil fuels with observance of environmental mitigation to reduce the negative impacts of transportation on the environment (Kozłowski, 2020). This is to justify that railway transportation decreases the production of greenhouse gas emission resulting in innovative and sustainable transportation.

Table 5: Mean and Standard Deviation of Environmental Impact

ENVIRONMENTAL IMPACT	MEAN	STANDARD DEVIATION	INTERPRETATION
1. The railway project will reduce the impact on climate change (e.g. flooding, extreme weather events, etc.).	3.05	.76	Agree

2. The railway project will reduce energy consumption and greenhouse gas (GHG) emissions.	3.12	.71	Agree
3. The railway project will cause unbearable noise and annoyance for the population living near railways.	2.95	.74	Agree
4. The railway project can lead to destruction and loss of natural ecosystems (e.g. disrupt local communities and habitats, etc.).	2.84	.90	Agree
5. The railway project creates less air pollution than road transportation such as jeepneys, buses, and other motor vehicles.	3.24	.64	Agree
Grand Mean	3.04	0.440	Agree

As reflected on the Table 6, the economic impact has the highest mean of 3.36 with the standard deviation of 0.526 or “Strongly Agree”, followed by socio-cultural impact with the mean of 3.19 and standard deviation of 0.487 or “Agree”. Meanwhile the environmental impact has the lowest mean of 3.04 with the standard deviation of 0.440 or “Agree”.

As reflected on the table, the economic impact has the highest mean of 3.36 with the standard deviation of 0.526 or “Strongly Agree”, followed by socio-cultural impact with the mean of 3.19 and standard deviation of 0.487 or “Agree”. Meanwhile the environmental impact has the lowest mean of 3.04 with the standard deviation of 0.440 or “Agree”.

Table 6: Mean and Standard Deviation of Level of Perception on Sustainability Impacts of North-South Railway Project

	MEAN	STANDARD DEVIATION	INTERPRETATION
Economic	3.36	0.526	Strongly Agree
Socio-Cultural	3.19	0.487	Agree
Environmental	3.04	0.440	Agree
Grand Mean	3.19	0.501	Agree

This shows that the respondents are more concerned with improving their livelihoods than with environmental protection, Thomas (2018) mentioned in her study that environmental issues are not seen as important by the public, and as a result, they are not interested in learning more about them. People intentionally ignore the facts, even when the issue starts to gain awareness. This indicates that the North-South Railway Project is expected to provide wider access to commodities, services, and job opportunities that can lead to economic growth and stability rather than provide environmental benefits.

SOP 3: How does the North-South Railway Project will benefit Maloleños' in terms of transport cost, travel time, and accessibility?

As shown in the Table 7, “The railway project can help in cutting costs of public transport.” has the

highest mean of 3.46 or “Strongly Agree”, while, “The railway project will contribute to vehicle operating cost savings for local residents who own cars (as residents shift to rail).” has the lowest mean of 3.27 or “Strongly Agree”. The Weighted mean has an average of 3.364 or “Strongly Agree”. This means that the respondents of Malolos are aware that they will experience low cost in public transport.

Moreover, the said project in terms of economics will benefit from time savings or reduction in their trip expenses that encourages users to travel more thus increasing the total number of trips, vehicle operating cost savings, road safety benefits, and greenhouse gas reduction benefits (Asian Development Bank, 2019).

Table 7: Mean and Interpretation on the Benefits of the North-South Railway Project in terms of Transport Cost

TRANSPORT COST	MEAN	INTERPRETATION
1. The railway project can help in cutting costs of public transport.	3.46	Strongly Agree
2. The railway project will provide affordable public transport to local residents.	3.37	Strongly Agree
3. The railway project will provide a cost-effective way for long-distance public transportation.	3.42	Strongly Agree
4. The railway project will contribute to vehicle operating cost savings for local residents who own cars (as residents shift to rail).	3.27	Strongly Agree
5. The railway project will provide a cost-effective way to transport and exchange goods.	3.30	Strongly Agree
Weighted Mean	3.364	Strongly Agree

As gleaned on Table 8, “The railway project will allow commuters to travel faster than the use of other common public transportations (e.g. jeepneys, buses, etc.)” has the highest mean of 3.41 or “Strongly Agree”, while, “The railway project will help minimize the passenger queuing (waiting) time.” has the lowest mean of 3.26 or “Strongly Agree”. The weighted mean is equivalent to 3.352 or “Strongly Agree”. This means that most of the respondents in Malolos are aware that the use of the railway project will give them a convenient ride within a short period of time. Along the Manila-Clark route, the proposed project will offer a quick, dependable, and comfortable form of transportation. (Asian Development Bank, 2019)

As seen on the table, “The railway project will allow local residents to reach long-distance destinations.”

has the highest mean of 3.45 or “Strongly Agree”, while, “The railway project will allow people with limited mobility experience to have access to public transport.” has the lowest mean of 3.29 or “Agree”. The grand mean is 3.34 or “Strongly Agree”. It shows that the majority of respondents strongly agreed on the benefits of the North-South Railway Project in terms of accessibility. It indicates that the railway transportation will have a significant beneficial effect on accessibility since it makes it more convenient for the local residents to travel outside the province and allows them to reach a distant place. Rail transport attempts to provide high-speed movement or high mobility that enables commuters to travel faster than using other modes of ordinary public transportation such as jeepneys and other motor vehicles (Quattrini, et al., 2022).

Table 8: Mean and Interpretation on the Benefits of the North-South Railway Project in terms of Travel Time and Accessibility

TRAVEL TIME	MEAN	INTERPRETATION
1. The railway project can provide fast access to the destination.	3.39	Strongly Agree
2. The railway project will reduce traffic congestion and long queues of vehicles on the road.	3.35	Strongly Agree
3. The railway project will help minimize the passenger queuing (waiting) time.	3.26	Strongly Agree

4. The railway project will allow commuters to travel faster than the use of other common public transportations (e.g. jeepneys, buses, etc.).	3.41	Strongly Agree
5. The railway project will cut down travel time during peak or rush hours.	3.35	Strongly Agree
Weighted Mean	3.352	Strongly Agree
ACCESSIBILITY	MEAN	INTERPRETATION
1. The railway project will allow local residents to reach long-distance destinations.	3.45	Strongly Agree
2. The railway project will help the local residents to gain access to better job opportunities, education, and other services.	3.30	Strongly Agree
3. The railway project will improve the spatial distribution of opportunities (e.g. employment, housing, health services, etc.).	3.31	Strongly Agree
4. The railway project will allow people with limited mobility experience to have access to public transport.	3.29	Strongly Agree
5. The railway project will help local commuters to have access to a cleaner and more environmentally friendly means of public transport.	3.39	Strongly Agree
Weighted Mean	3.348	Strongly Agree

SOP 4: Is there a significant difference in the perception of sustainability impact assessment in the Municipality of Malolos when they are grouped according to profile?

Table 9: Test of Difference in the Perception of Sustainability Impact Assessment in the Municipality of Malolos When They are Grouped According to Profile

ANOVA				
	<i>F</i>	<i>P - value</i>	<i>Decision</i>	
Age	1.877	.121	Not Significant	Accepted
Gender	1.803	.182	Not Significant	Accepted
Employment Status	.876	.500	Not Significant	Accepted
Educational Attainment	.398	.849	Not Significant	Accepted
Years of Residency	.338	.789	Not Significant	Accepted

*Significant at level 0.05

As illustrated in the table above, residents' perception; for age using One-Way ANOVA, F - Value of 1.877 and P-value of .121 interpreted as Not Significant. On the other hand, for gender using One-Way ANOVA, F - Value of 1.803 and P-value of .182 interpreted as Not Significant. For employment status One-Way ANOVA shows that, F - Value of .876 and P-value of .500 interpreted as Not Significant. For educational attainment, it appears that the use of One-Way ANOVA resulted in F - Value of .398 and P-value of .849 interpreted as Not Significant. For years of residency, using One-Way ANOVA, F - Value of .338 and P-value of .789 interpreted as Not Significant.

Table 9 strengthens the observation on the comparison of the means of the residents' perception regarding sustainability impact; it shows that the P value of .000 was greater than the significant level of 0.05; hence, the null hypothesis was accepted. This implies that there was no significant difference in the perception of sustainability impact in the Municipality of Malolos when they were grouped according to profile.

SOP 5: What recommendations may be considered to further improve the sustainability of transportation?

The following are some recommendations that can be made to improve the sustainability of transportation:

- Proper management of budgeting to the project. Corruption must be eliminated to provide high quality public transportation and to sustain it for a long run.
- Invest in new technologies that reduce greenhouse gas emissions, build infrastructure to withstand effects of climate change.
- Enough public transportation vehicles and maintained fuel prices.
- Other than having railways, supporting the construction of bike-friendly routes and improving policies around bike safety can be a big step to improve sustainability of transportation.
- It can be made better by cutting back on pointless kilometers (or miles), improving freight load management, increasing data openness, and improving coordination and communication among sectors. Consider the balance between humans, vehicles, and the environment.
- Reduce the use of different vehicles. Transportation in the country is not adequate enough to cater the public in terms of public transportation, however the government should increase the capacity and budget of the research development of road infrastructure that is sufficient to help and ease the existing problem.

Furthermore, the government should assign a right person for the right task, likewise in other countries, whereas the cabinet members are aligned in terms of their position. This will reduce the inconvenience and raise more development solutions in improving our transportation problem.

- More functional trains and remove all road obstruction.
- Utilize and maximize the use of mass transportation like trains and buses and start innovating when it comes to energy consumption. Start using electric energy instead of fossil fuels for cars, which is the greatest contributor of global warming and climate change. Make it affordable and low cost by also reducing emissions of fuels and energy.

Conclusion

The demonstrated studies and results underline the anticipated sustainability impact of the North-South Railway Project based on the perception of the residents in Malolos, Bulacan. After gathering data from 100 participants which are Malolos residents, the researchers determined that the railway project is expected to have a significant positive impact on them in terms of economic, sociocultural, and environmental aspects. The findings of this study showed that the NSRP is most likely to bring economic impacts among the other pillars of sustainability.

Furthermore, the weighted mean of the items revealed that the participants believed that the NSRP would aid economic development as it contributes to the development of infrastructures and investments. With regard to socio-cultural impact, they expect the railway project to bring better access to opportunities in terms of employment, education, and other social benefits. As rail transport is known to be one of the most sustainable modes of transport, the NSRP's environmental impact is believed to cause less pollution compared to other modes of transport that are commonly used. In addition, the findings also showed that the railway project is more likely to benefit the residents in terms of accessibility, transportation cost, and travel time. Thus, the researchers concluded that the North-South Railway Project is a sustainable transportation that would positively impact the Malolos residents' quality of life.

Recommendations

This study was purposed to determine the Residents' perception in sustainability impact of the north-south railway project in Malolos, Bulacan. And, as a result of the process, researchers were able to seek a definite result, with the majority of local residents or respondents strongly believing that the North-South Railway project has a sustainable impact in

the municipality of malolos. Furthermore, the researchers would like to make the following suggestions to improve the study:

1. The researchers encourage the Municipal Government of Malolos to cooperate with the local community in terms of their concerns about the railway project as it affects the day-to-day lives of the residents. The government may hold programs such as seminars to raise awareness about the importance of three pillars: economic, sociocultural, and environmental. Considering that the environmental impact garnered the lowest mean based on the data collected from "Level of Perception on Sustainability Impacts of the North-South Railway Project". An environmental issue is not seen as important by the public, and as a result, they are not interested in learning more about it. People intentionally ignore the facts, even when the issue starts to gain awareness (Thomas, 2018).
2. The researchers recommend that the Municipality of Malolos be prepared for the development in order to improve mobility since a railroad project will result in economic growth and provide residents with stable employment opportunities. These effects may also increase corporate investment, leading to more job opportunities. Supporting sectors that provide goods and services to make direct investment possible may experience indirect economic benefits (Mohmand, Wang, and Saeed, 2017).
3. Since the researchers' study only focuses on malolos Bulacan, future researchers could expand it by incorporating more variables relevant to the study in order to broaden its concept and see its capabilities to achieve a greater output.
4. The study could also be replicated by widening the numbers and options in terms of respondents. Since the study was constructed with the combination of quantitative research and convenience sampling method, future researchers can also use that technique to further collect and gather relevant answers that will make them achieve a more precise presentation of findings.
5. Researchers hope to improve the study by providing more questions for data collection in order to measure and expand the ideas and information to obtain further significant findings. Also, it could be possible to use both qualitative and quantitative methods to gather and construct a more accurate or well improved research study in the future.

Conflict of Interest

There is no conflict of interest between the authors in this manuscript.

References

1. Asian Development Bank (2019). Asian Development Outlook 2019 Update: Fostering Growth and Inclusion in Asia's Cities. Mandaluyong City: Asian Development Bank.
2. Asian Development Bank (2019). Malolos-Clark Railway Project: Economic and Financial Analysis. Asian Development Bank. <https://www.adb.org/sites/default/files/linked-documents/52083-001-efa.pdf>
3. Asian Development Bank (2021). Philippines: Commuter Corridor Leads Rail Revival. Asian Development Bank. <https://www.adb.org/news/features/philippines-commuter-corridor-leads-rail-revival>
4. Azzouz, L. and Jack, A. (2021). Social Exclusion and High-Speed Railways: Evidence from China. *The Open Transportation Journal*, 15, 133-146. [10.2174/1874447802115010133](https://doi.org/10.2174/1874447802115010133)
5. Blanquart, C. & Koning, M. (2017). The local economic impacts of high-speed railways: theories and facts. *Eur. Transp. Res. Rev.* 9, 12. <https://doi.org/10.1007/s12544-017-0233-0>
6. Carroll, S., Ferareza, C. & Camangeg, M. (2021). Creating competitive advantage through sustainability. Grant Thornton. <https://www.grantthornton.global/en/insights/articles/creating-competitive-advantage-through-sustainability/>
7. Chamseddine, Z. and Boubkr, A.A. (2020). Exploring the place of social impacts in urban transport planning: the case of Casablanca City. *Urban, Planning and Transport Research*, 8(1), 138-157. <https://doi.org/10.1080/21650020.2020.1752793>
8. Correia, Maria (2019). Sustainability: An Overview of the Triple Bottom Line and Sustainability Implementation. *International Journal of Strategic Engineering*. https://www.researchgate.net/publication/330057873_Sustainability_An_Overview_of_the_Triple_Bottom_Line_and_Sustainability_Implementation/citation/download
9. Estember, R.D., Pedro, H.B.S.S. & Tan, J.C.L. (2020). Operational Efficiency Model for a Railway Transit in the Philippines. *Proceedings of the 2020 2nd International Conference on Management Science and Industrial Engineering*, 319-325. <https://doi.org/10.1145/3396743.3396798>.
10. Fernandez, H.A. (2019). What the Philippines' US\$2.75 billion rail project means for commuters and the environment. *Eco-Business.com*. <https://www.eco-business.com/news/what-the-philippines-us275-billion-rail-project-means-for-commuters-and-the-environment/>
11. Goh, M.L.I. & Goh, J.E.E. (2019). Smart Crowd Control Management System for Light

- Rail Transit (LRT) 1. 2019 International Conference on Computational Intelligence and Knowledge Economy (ICCIKE), 608-613. <https://doi.org/10.1109/iccike47802.2019.9004316>.
12. Gschösser, F., Cordes, T., Lumetzberger, D., Tautschnig, A. & Bergmeister, K. (2020). Railway transport systems' contribution to sustainable development. IOP Conference Series: Earth and Environmental Science. <https://iopscience.iop.org/article/10.1088/1755-1315/588/5/052024/pdf>
13. Gueco, M.A.N. (2022). North-South Computer Railway operational in 2024. NEDA 3 Central Luzon. <https://nro3.neda.gov.ph/north-south-commuter-railway-operational-in-2024/>
14. Kozłowski, M., Pawełczyk, M. & Piotrowska-Piątek, A. (2020). Innovativeness of railway transport in the context of the development of tourism in Poland. *Qual Quant*, 54, 1691-1703. <https://doi.org/10.1007/s11135-019-00928-z>
15. Marianna, J. & Mariusz, W. (2017). The study of transport impact on the environment with regard to sustainable development. *JVE International Ltd*. <https://doi.org/10.21595/vp.2017.19093>
16. Martins, V.W.B., Anholon, R. and Quelhas, O.L.G. (2019). Sustainable Transportation Methods. Springer Nature Switzerland. https://doi.org/10.1007/978-3-319-63951-2_192-1
17. Mohmand, Y.T., Wang, A. & Saeed, A. (2017). The impact of transportation infrastructure on economic growth: empirical evidence from Pakistan, *Transportation Letters*, 9(2), 63-69. DOI: 10.1080/19427867.2016.1165463
18. Ngoc, A.M. & Nishiuchi, H. (2022). Impact of High-Speed Rail on Social Equity-Insights from a Stated Preference Survey in Vietnam. *Sustainability*, 14(2), 602. <https://doi.org/10.3390/su14020602>
19. Nilsson, I. & Delmelle, E.C. (2020). Impact of new rail transit stations on neighborhood destination choices and income segregation. *Cities*, 102. <https://doi.org/10.1016/j.cities.2020.102737>
20. Økland, A., Olsson, N.O.E. & Venstad, M. (2021). Sustainability in Railway Investments, a Study of Early-Phase Analyses and Perceptions. *Sustainability*, 13(2), 790. MDPI AG. Retrieved from <http://dx.doi.org/10.3390/su13020790>
21. Peira, G., Guidice, A.L. & Miraglia, S. (2022). Railway and Tourism: A Systematic Literature Review. *Tour. Hosp.*, 3(1), 69-79. <https://doi.org/10.3390/tourhosp3010005>
22. Philippine Information Agency (2020). DOTr, UNDP promote environment-friendly transport system. *Philippines News.Net*. <https://www.philippinesnews.net/news/263657981/dotr-undp-promote-environment-friendly-transport-system>
23. Sundling, C. & Ceccato, V. (2022). The impact of rail-based stations on passengers' safety perceptions. A systematic review of international evidence. *Transportation Research Part F: Traffic Psychology and Behaviour*, 86, 99-120. <https://doi.org/10.1016/j.trf.2022.02.011>
24. United Nations Conference on Trade and Development (2022). Climate Change Impacts and Adaptation for Coastal Transport Infrastructure: A Compilation of Policies and Practices. https://unctad.org/system/files/official-document/dtltlb2019d1_en.pdf
25. United Nations (2021). Sustainable transport, sustainable development. Interagency report for second Global Sustainable Transport Conference. <https://www.un.org/en/conferences/transport2021>
26. Wang, L., Zhang, S. & Chen, C.L. (2020). Exploring the physical and mental health of high-speed rail commuters: Suzhou-Shanghai inter-city commuting. *Journal of Transport & Health*, 18. <https://doi.org/10.1016/j.jth.2020.100902>
27. Wu, C., Zhang, N. & Xu, L. (2021). Travelers on the Railway: An Economic Growth Model of the Effects of Railway Transportation Infrastructure on Consumption and Sustainable Economic Growth. *Sustainability* 2021, 13, 6863. <https://doi.org/10.3390/su13126863>
28. Zhuang, X., Yao, Y. and Li, J. (2019). Sociocultural Impacts of Tourism on Residents of World Cultural Heritage Sites in China. *Sustainability*, 11(3), 840. <https://doi.org/10.3390/su11030840>