



Volume 131

2026

p-ISSN: 0209-3324

e-ISSN: 2450-1549

DOI: <https://doi.org/10.20858/sjsutst.2026.131.3>

Journal homepage: <http://sjsutst.polsl.pl>



Article citation information:

Bąk, M., Borkowski, P., Zamojska, A. Shifting tracks in regional rail: unpacking stakeholder attributes and perceived connectivity. *Scientific Journal of Silesian University of Technology. Series Transport*. 2026, **131**, 45-61. ISSN: 0209-3324.

DOI: <https://doi.org/10.20858/sjsutst.2026.131.3>

Monika BĄK¹, Przemysław BORKOWSKI², Anna ZAMOJSKA³

SHIFTING TRACKS IN REGIONAL RAIL: UNPACKING STAKEHOLDER ATTRIBUTES AND PERCEIVED CONNECTIVITY

Summary. This study examines how perceptions of stakeholder salience shape user attitudes and behaviors towards the Pomeranian Metropolitan Railway (PKM) in northern Poland, focusing on the moderating role of transportation connectivity. Utilizing repeated cross-sectional survey data collected in 2019, 2020, and 2021, the study analyzes how user perceptions of power, legitimacy, and urgency impact attitudes and rail usage behavior. The results highlight a significant shift in the moderating effect of perceived connectivity, which transitioned from a positive influence in 2020 to a negative one in 2021, indicating increasing disillusionment with the rail system's responsiveness to users' expectations. This study provides key insights into how external disruptions, such as the COVID-19 pandemic, interact with connectivity perceptions to influence regional rail usage patterns.

Keywords: stakeholder attributes, railway usage; connectivity, pandemic impact

¹ Department of Transport Economics, Faculty of Economics, University of Gdansk, ul. Armii Krajowej 119/121, 81-824 Sopot, Poland. Email: monika.bak@ug.edu.pl. ORCID: <https://orcid.org/0000-0001-7401-7102>

² Department of Transport Economics, Faculty of Economics, University of Gdansk, ul. Armii Krajowej 119/121, 81-824 Sopot, Poland. Email: przemyslaw.borkowski@ug.edu.pl. ORCID: <https://orcid.org/0000-0002-5998-6965>

³ Department of Econometrics, Faculty of Management, University of Gdansk, ul. Armii Krajowej 101, 81-824 Sopot, Poland. Email: anna.zamojska@ug.edu.pl. ORCID: <https://orcid.org/0000-0002-3248-1596>

1. INTRODUCTION

The increasing demand for sustainable urban and regional mobility has prompted cities and regions across Europe to invest in modern public transport systems that not only reduce environmental impact but also support spatial cohesion and economic development. One of the most prominent examples of such investment in Poland is the Pomeranian Metropolitan Railway (PKM), launched in 2015 to improve connectivity within the Tricity metropolitan area and the broader Pomeranian Voivodeship. The light rail and regional rail could be considered an alternative to road connectivity in cities and their metropolitan areas. While infrastructure development and service integration have been key components of PKM's success, less attention has been paid to the behavioral determinants influencing individual usage of this rail system over time. The role of behavior in modal choices and travel decisions could be investigated through the lens of the Stakeholder Salience Theory (SST). While a more frequent approach is to apply Theory of Planned Behavior (TPB) (Ajzen 1991) which concentrates on attitudes toward the behavior, subjective norms, and perceived behavioral control SST could be more useful when analyzing the distortions to the regular travel patterns. For instance, during a pandemic, commuters might lose urgency if working from home, while essential workers gain urgency and possibly power through media attention or political support. SST would recommend shifting focus to studying and accommodating these new stakeholder behaviors. When applied to public transportation and regional rail specifically, these factors correspond to travelers' evaluations of rail services, the influence of social and cultural expectations, and the extent to which individuals feel capable of using the system. Understanding these psychological dimensions is critical for tailoring transport policies and marketing strategies to increase ridership and encourage mode shift from individual cars to public transport. While this framework has been applied to assess factors influencing public transportation usage, offering valuable insights for policymakers and urban planners, it is surprisingly sparsely applied to rail transport scenarios.

Few empirical studies have demonstrated the efficacy of approaches based on behavioral models in predicting rail travel users' actions. For instance, research in Klang Valley, Malaysia, indicated that, except for typical TPB drivers, other external factors of trust and novelty seeking behavior significantly influenced commuters' intentions to use the Light Rail Transit (LRT) system (Hussain 2020). Similarly, a study in Petaling Jaya, Malaysia, extended the traditional TPB based model by incorporating situational factors, trust, novelty-seeking, and external influences to the effect that situational factors had an indirect negative effect through perceived behavioral control (Madha et al. 2016). Other models were used to predict residents' intentions to use the metro in Doha (Shaaban and Maher 2020) and Dhaka (Saleh et al. 2023) resulting in the observation that perceived behavioral control was a significant predictor only for work-related travel, whereas subjective norms played a more substantial role in leisure travel intentions.

Neither of the rail-oriented studies utilizing the traditional TPB approach has looked into the longer periods, and none has been based on the repetitive data collection over the years.

This paper aims to apply different Stakeholder Salience Theory (STT) based models to assess the factors influencing passenger behavior and usage of regional rail in a more comprehensive way. The empirical foundation of the current study comprises three field surveys conducted in 2019, 2021, and 2023, respectively. These cross-sectional analyses utilized structured questionnaires to gather data on passenger attitudes, intentions, and actual use of the PKM, allowing for longitudinal insights into how behavioral patterns evolved before, during, and after the COVID-19 pandemic. The temporal span of the research enables

the identification of both persistent and context-sensitive behavioral trends, particularly in response to broader socio-environmental changes such as lockdowns or rising environmental awareness.

The findings will contribute to a deeper understanding of the psychological determinants of rail travel behavior. In addition, current research looks into the broad perspective of pre-, during, and after-COVID-19 pandemic situations. While there are some studies looking into rail user behavior during pandemics (Ali, Nakayama, and Yamaguchi 2023; Zhang et al. 2021), to our knowledge, none offer a comparative analysis of pre-, during, and post-pandemic dynamics.

By combining theoretical modeling with empirical data from the PKM case, this study contributes to behaviorally informed transport planning. It aims to inform decision-makers about the psychological and contextual factors that condition rail usage and to suggest targeted interventions for increasing user adoption in the context of expanding rail networks in metropolitan areas.

2. CONCEPTUAL FRAMEWORK

In this study, we draw on Stakeholder Salience Theory, developed by (Mitchell, Agle, and Wood 1997), which addresses a fundamental question in stakeholder management: Which stakeholders do managers pay attention to, and why? According to the theory, stakeholders differ in their possession of three critical attributes: power, legitimacy, and urgency. A stakeholder's salience, or their ability to attract managerial attention, depends on how many of these attributes they hold. The more attributes they possess, the more salient they are perceived to be (Mitchell, Agle, and Wood 1997).

Since its initial formulation, SST has undergone extensive development, inspiring hundreds of empirical and theoretical contributions. Scholars have validated the core attributes empirically and explored their influence on decision-making processes. Other studies have extended the theory by incorporating additional dimensions such as contextual dynamics, emotions, and temporality (Wood et al. 2021). At the same time, SST has faced critique, particularly concerning the potential subjectivity and arbitrariness in assessing the attributes. In response, some researchers have proposed alternative stakeholder frameworks, while others have sought to bridge SST with complementary theories, including institutional and cultural perspectives (e.g., (Neville, Bell, and Whitwell 2011; Raha, Hajdini, and Windsperger 2021; Reynolds, Schultz, and Hekman 2006)).

Although SST was initially rooted in a managerial perspective—evaluating stakeholders from the standpoint of organizational decision-makers—recent research has increasingly explored how stakeholders perceive their salience. For instance, Boesso and Kumar examined how organizational culture influences how managers perceive stakeholder salience, emphasizing the role of subjective and context-specific interpretations (Boesso and Kumar 2016). Similarly, Koleva et al. highlighted how cultural and social settings shape how salience is perceived (Koleva, Sidani, and Meadows 2022).

Our study contributes to this evolving stream of research by applying SST in a novel context: that of public infrastructure users, specifically commuters using a newly launched regional rail service. We investigate how these users view their role as stakeholders and whether such self-perceptions correlate with their actual usage behavior. This approach offers fresh insight for transport policy design, especially in encouraging modal shifts from private cars to medium-range rail services, which are integral to sustainable transport systems. We specifically ask

whether users' perceptions of power, legitimacy, and urgency influence the frequency with which they use the rail service. More precisely, we aim to understand if these perceptions are linked to a behavioral transition—namely, a shift from car usage to commuting by train. While previous studies have identified various behavioral, organizational, and policy factors that promote sustainable transport and reduce car dependency in urban commuting, we are unaware of research exploring the connection between users' perceived stakeholder role in a transportation project and their transportation behavior change. Our study seeks to fill this gap in the literature.

Moreover, we explore whether these stakeholder perceptions change over time. Although the study is not longitudinal in design, data were collected across three separate points (2019, 2020, and 2021), which span the COVID-19 pandemic period. This design enables us to analyze temporal variations in stakeholder self-perceptions.

Lastly, we investigate the effect of a moderating variable. Understanding what factors influence the relationship between stakeholder self-perception and actual behavior is crucial. In our context—a rail line connecting small towns and suburban areas to the Tri-City metropolitan region—we identify transport connectivity (SKOM) as a key moderator. This includes how well the rail system is integrated with other modes of transport (e.g., buses, cycling infrastructure) and the presence of park-and-ride or bike-and-ride facilities. Numerous studies have shown that such integration significantly boosts public rail usage across various global contexts (Geurs, La Paix, and Van Weperen 2016; Ibrahim 2003; Pucher and Buehler 2009). Well-connected train stations often evolve into urban mobility hubs, stimulating a substantial increase in public transit ridership (Bubeliny, Kubina, and Varmus 2021; Pshinko et al. 2025; Torabi K et al. 2022).

Based on these considerations, our research hypotheses are as follows:

H1 – Passenger attributes (power, legitimacy, and urgency) influence their attitude (AT) toward the regional railway service (PKM).

H2 – Attitude (AT) influences the frequency of using the regional railway service (PKM).

H3 – The relationship between attitude (AT) and the frequency of using PKM is moderated by the level of intermodality between modes of transport (SKOM).

Figure 1 presents the conceptual model that guides this study.

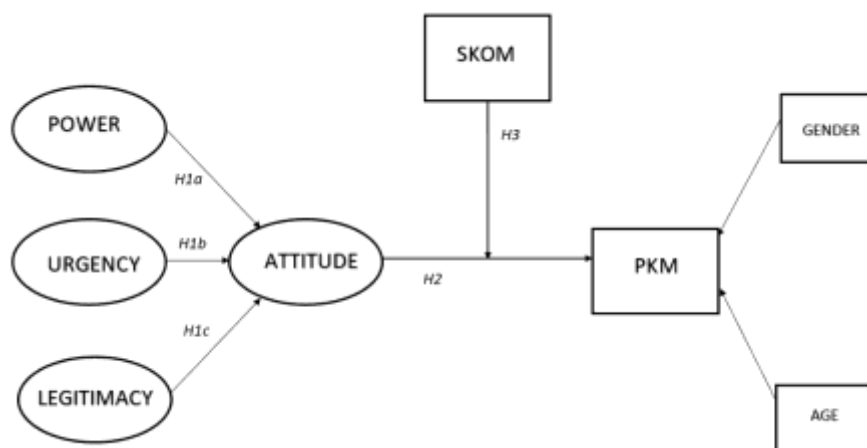


Fig. 1. Conceptual model

3. RESEARCH METHOD

3.1. Study Setting

The Pomeranian Metropolitan Railway (Polish: Pomorska Kolej Metropolitalna, PKM) represents the first new regional rail line in more than 20 years. Located in the Pomeranian Voivodeship (Northern Poland on the Baltic coast), the PKM was conceived to enhance regional mobility, particularly in the Gdansk metropolitan area, and to facilitate multimodal integration with national and international transport networks, including the Gdansk Airport. Commissioned in September 2015, the PKM line spans approximately 20 kilometers. The project's core objectives included relieving urban traffic congestion, improving accessibility to peripheral areas, and providing sustainable alternatives to road-based commuting. Notably, the railway provides direct, high-frequency service between major cities in the region and the airport, forming a semi-orbital connection that bypasses the traditional city-center bottlenecks. The key expected benefit of the rail creation was to influence commuters' behavior. Like in many metropolitan areas across the world, Gdansk witnessed the suburbanization and commuting challenges caused by households' migration towards the exterior.

The PKM project was planned as a relief to the increasing daily congestion. In that regard, PKM was rather a success. According to the Polish Railway Authority (UTK) ridership numbers have risen from approximately 140 thousand at its launch in 2015; it exceeded 3 million passengers by the end of 2018. The average monthly ridership in 2019, just before the COVID-19 pandemic, was 386 thousand passengers. The year 2020 brought a pandemic and a decline in ridership falling by more than 50%. In the following year, the slow recovery began with the rail reaching its pre-COVID ridership in the second half of 2023. While COVID-19 had a strong impact on the ridership, the detailed analysis of users' attitudes and actions reveals that it is a more complex set of behavioral interactions that produced those numbers before, during, and after the pandemic.

3.2. Survey, Sample and Data Collection

The study was conducted in the fall of three consecutive years: 2019, 2020, and 2021, specifically during September and October each year. This consistency in timing allowed us to control for seasonal variation in travel behavior. The target population consisted of users of the PKM railway service, and data were collected using the PAPI method (Paper and Pencil Interviewing) in the vicinity of railway stations. The target sample size each year was at least 500. After data cleaning, the final sample sizes were $N = 504$ in 2019, $N = 502$ in 2020, and $N = 500$ in 2021.

It is important to note that this study was not longitudinal in a strict sense, as different individuals were surveyed in each wave. Therefore, it does not allow for tracking individual-level changes over time (Downey and Kenny 2024). However, the study design aligns with a repeated cross-sectional approach, which involves collecting data from different samples of the same population at multiple time points (Pérez-Guerrero et al. 2024). It enables the observation of broader temporal trends and shifts in stakeholder salience perceptions. Moreover, since the study spans a period that includes the COVID-19 pandemic, it offers a unique opportunity to analyze how such external disruptions may have affected public transport users' attitudes and behaviors.

In this study, we examine how perceptions of stakeholder salience shape users' attitudes toward a regional railway service, and how these attitudes relate to actual usage behavior. Drawing on Stakeholder Salience Theory, we conceptualize these attributes as latent variables measured through user self-report. Additionally, we investigate the moderating role of transportation connectivity and control for sociodemographic characteristics. The following table outlines the operational definitions and measurement approaches used for each variable in the conceptual model.

Tab. 1

Operationalization of variables

Variable	Type & Measurement	Items / operational definitions
Attitude		
AT1	Independent (latent) Likert-scale	I had a positive attitude toward the construction and launch of PKM
AT2	Independent (latent) Likert-scale	My attitude toward the project implementation is clearly positive
AT3	Independent (latent) Likert-scale	Fast implementation of the project was very important to me
AT4	Independent (latent) Likert-scale	Those implementing the project could count on my support
Power		
ATP1	Independent (latent) Likert-scale	I had a real influence on the project implementation
ATP2	Independent (latent) Likert-scale	I had the right to be consulted about the project
ATP3	Independent (latent) Likert-scale	I believe it was reasonable to consult me on the project
ATP4	Independent (latent) Likert-scale	Changes to PKM (schedules/routes) depend on me
Legitimacy		
ATL1	Independent (latent) Likert-scale	I had the right to be consulted on the project
ATL2	Independent (latent) Likert-scale	I believe it was legitimate to consult me on the project
ATL3	Independent (latent) Likert-scale	Changes to PKM (schedules/routes) depend on me
Urgency		
ATU1	Independent (latent) Likert-scale	In my opinion, the project was an urgent matter
ATU2	Independent (latent) Likert-scale	My attitude toward the project implementation is clearly positive

SKOM (Connectivity)	Moderator Likert-scale	How would you rate the level of connectivity between the PKM railway service and other modes of transport?
PKM Usage Frequency	Dependent variable Likert-scale	How often do you use the PKM railway service in your daily travels?
Gender	Control variable Binary: male/female	
Age	Control variable Ordinal categorical	

3.3. Analytical framework

The study employed a diverse set of quantitative data analysis methods. During the first stage of the analytical phase, variable distributions were assessed, and proportions were calculated to capture the relative shares of individual categories within the overall responses. To compare structural patterns between two samples, a statistical test z , of the significance of differences between proportions was applied. This test makes it possible to determine whether the observed differences are statistically significant (Derrick et al. 2025).

Additionally, the τ Kendall nonparametric rank correlation coefficient was used to evaluate ordinal and qualitative relationships between selected variables. This method is robust to violations of normality assumptions and particularly well-suited for analyzing dependencies in ordinal data (Fieller E. C., Hartley, and Pearson 1957). It allows for identifying monotonic associations between features, which is essential for examining attitudes, preferences, and behavioral patterns related to urban public transport use.

The main modeling procedure used partial least squares structural equation modeling (PLS-SEM), implemented with the PLS-SEM package and STATA 18 software (Venturini and Mehmetoglu 2019). Unlike the traditional covariance-based SEM (CB-SEM), the PLS-SEM approach offers greater flexibility - it accommodates small sample sizes, non-normal data distributions, and complex theoretical models (Hair et al. 2019).

4. RESULTS

4.1. Descriptive Statistics

Analyzing the data from Table 2, it is noteworthy that, according to the established sampling scheme, the structure of respondents is equally weighted in terms of gender. Across all studied years, the most significant number of respondents falls within the age group of 19-25 years, followed by the age category of 31-40 years. The age groups of 26-30 years and above 41 years are relatively similar in size. The smallest proportion of respondents is in the < 18 age group. Overall, the distribution of respondents across different age groups indicates that younger age groups (< 18 years) are less represented than older age groups.

Tab. 2

Structure of the demographics of respondents (%)

Demographic	2019	2020	2021
Gender			
Male	46.6	49.8	47.8

Female	53.4	50.2	52.2
Age			
< 18	5.4	7.3	3.0
19-25	31.1	24.0	27.4
26-30	14.5	14.7	11.8
31-40	20.9	23.4	24.0
41-50	13.9	16.3	18.6
>50	14.1	14.3	15.2

N = 504 for 2019, N = 502 for 2020, N = 500 for 2021

4.2. Dependent Variable PKM Comparative Analysis for 3 Years

Analysis of the distribution of daily travel using the Pomeranian Metropolitan Railway (PKM) is presented in Table 3. In the first part of the comparative analysis, the shape of the distribution was determined for the three consecutive years from 2019 to 2021. Subsequently, using the test z for the significance of structural differences between two populations, we examined whether significant changes occurred between 2019 and 2021. Table 3 presents the distribution of responses and the results of the test z . We observe a change in the case of individuals who travelled daily on weekdays, with a decrease from 55.4% in 2019 to 41.2% in 2021, and the test z statistic confirms that this change is statistically significant (0.002). Additionally, the category of individuals who occasionally used PKM decreased from 14.1% to 7.6%, but this change is not statistically significant. For the remaining categories, an increase was observed, with only the category of individuals using PKM 3-4 times a week showing a statistically significant increase in the structural index (0.045).

Table 3 presents the distribution/structure of responses regarding the frequency of travel using the Pomeranian Metropolitan Railway (PKM) between 2019 and 2021 and the results of z -tests for structural differences between 2019 and 2021. In the first stage of the analysis, the distributional patterns of PKM usage were identified across the three years. Subsequently, z -tests were applied to assess whether the observed changes between 2019 and 2021 were statistically significant. A notable decrease was observed in the proportion of individuals commuting daily on weekdays, from 55.4% in 2019 to 41.2% in 2021; this difference was statistically significant ($z = -3.05$, $p = 0.002$). A statistically significant increase was also recorded for individuals travelling 3-4 times per week, rising from 14.1% to 26.4% ($z=2.01$, $p=0.045$). Although changes were noted in other frequency categories, none of these differences reached statistical significance.

Tab. 3

PKM usage in the years 2019-2021 and the z -test results for 2019 and 2021

PKM variable	Group	2019	2020	2021	z -test	p -value
every weekday	1	55.4	50.4	41.2	-3.05	0.002
3-4 times per week	2	14.1	14.1	26.4	2.01	0.045
1-2 times per week	3	6.2	7.1	14.4	1.16	0.245
less than once per week	4	10.2	9.3	10.4	0.04	0.968
occasionally – less than once every two weeks	5	14.1	19.0	7.6	0.92	0.357

An essential factor influencing the frequency of PKM is the respondent's assessment of the degree of connectivity (SKOM). Table 4 presents the two-dimensional distribution of respondents based on both characteristics. For each year separately, the τ Kendall coefficient was calculated to assess the strength and direction of the distribution of these two characteristics. Notably, Group 1, which most frequently used PKM, rated the degree of connectivity positively before COVID-19 (32.3%). In 2020, these ratings shifted to the "poor" category (18.1%), and this trend continued in 2021, with 26.2% of respondents in this group rating the degree of connectivity as "very poor." In the same year, the respondents commuting to work 3-4 times a week also rated the degree of connectivity as "very poor" (17.4%). Therefore, it can be indicated that the positive correlation between frequency of use and assessment of connectivity in 2019 (τ Kendall coefficient 0.08), which slightly strengthened during the COVID year (0.10), changed to a negative correlation post-COVID, confirmed by a statistically significant τ Kendall coefficient of -0.06.

Tab. 4

PKM usage in the years 2019-2021 and the z-test results for 2019 and 2021

Year	SKOM	PKM (group number)					τ Kendall	z test	p-value
		1	2	3	4	5			
2019	Very good	12.0	3.6	1.6	1.6	2.8	0.08	2.70	0.007
	Good	32.3	6.6	2.4	4.4	8.2			
	Neutral	5.8	2.0	1.2	1.0	0.2			
	Bad	0.6	0.0	0.0	0.2	0.0			
	Very bad	4.8	2.0	1.0	3.0	3.0			
2020	Very good	8.1	1.8	0.6	1.4	1.2	0.10	3.47	0.001
	Good	7.3	1.4	0.8	1.0	2.8			
	Neutral	6.2	0.6	0.8	1.8	1.4			
	Bad	18.1	5.2	2.4	3.8	7.5			
	Very bad	10.7	5.2	2.6	1.4	6.2			
2021	Very good	1.4	0.6	1.0	0.6	0.0	-0.06	-2.02	0.043
	Good	2.6	2.6	2.2	1.2	0.0			
	Neutral	8.2	3.8	3.2	3.2	0.4			
	Bad	2.8	2.0	2.0	2.0	0.6			
	Very bad	26.2	17.4	6.0	3.4	6.6			

4.3. Estimation Results

The results of the measurement model estimation, presented in Table 5, indicate a generally acceptable level of construct validity and reliability for 2019-2021. For most latent variables, the factor loadings (L1) exceed the recommended threshold of 0.70, confirming convergent validity. Reliability indicators, such as Composite Reliability (Dillon-Goldstein's rho, DG), and Cronbach's Alpha (Cronbach), demonstrate stable values above 0.70, with only a few exceptions, suggesting good internal consistency overall. Constructs such as ATTITUDE and URGENCY exhibit high reliability across all examined years (DG above 0.82 and Cronbach's Alphas ranging from 0.75 to 0.89). The average variance extracted (AVE) also exceeds the threshold of 0.50 in most cases, indicating that more than half of the variance in each construct is explained by its indicators. However, some decline in measurement quality is observed for

the LEGITIMACY construct in 2021—both AVE (0.49) and Cronbach's Alphas (0.61) fall below the recommended values, which may suggest the need to revise the scale or improve the operationalization of the variable. A similar pattern is noted for the POWER construct in 2021, where AVE is only 0.53 and Cronbach's Alpha drops to 0.71. Despite these deviations, the results suggest that the measurement model fits the data well and meets the fundamental psychometric requirements for construct validity and reliability.

Tab. 5

Measurement Model Estimation Results

Variable	2019				2020				2021			
	Loading	DG	Cronbach	AVE	Loading	DG	Cronbach	AVE	Loading	DG	Cronbach	AVE
POWER		0.89	0.84	0.67		0.89	0.84	0.66		0.82	0.71	0.53
ATP1	0.84				0.84				0.76			
ATP2	0.85				0.85				0.82			
ATP3	0.80				0.81				0.68			
ATP4	0.79				0.75				0.64			
LEGITIMACY		0.82	0.77	0.62		0.79	0.74	0.58		0.71	0.61	0.49
ATL1	0.96				0.97				0.97			
ATL2	0.83				0.79				0.67			
ATL3	0.49				0.42				0.64			
URGENCY		0.89	0.76	0.80		0.89	0.75	0.79		0.84	0.62	0.72
ATU1	0.89				0.89				0.83			
ATU2	0.90				0.89				0.87			
ATTITUDE		0.89	0.83	0.66		0.88	0.82	0.65		0.84	0.75	0.58
AT1	0.72				0.73				0.69			
AT2	0.89				0.87				0.84			
AT3	0.77				0.75				0.74			
AT4	0.87				0.87				0.75			

Loading – factor loadings, DG – Dillon-Goldstein's rho, Cronbach – Cronbach's Alpha, AVE – average variance extracted

The results of the structural model estimation using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach, presented in Table 6, reveal significant differences in the relationships between variables across the analyzed years 2019-2021. The key predictor of the dependent variable, Attitude, remains Urgency, whose influence is strong and statistically significant in all three periods ($\beta = 0.79$; $p < 0.001$ in 2019; $\beta = 0.76$; $p < 0.001$ in 2020; $\beta = 0.70$; $p < 0.001$ in 2021). In contrast, the variable Power shows a negative and significant effect on attitudes ($\beta \approx -0.20$; $p < 0.001$) each year, suggesting that a higher perception of Power is associated with less favorable Attitudes toward the analyzed relationship. The effect of Legitimacy on Attitudes was only significant in 2019 ($\beta = -0.10$; $p = 0.02$), and disappeared in the subsequent years. An interesting dynamic also emerges in the interaction effect $SKOM \times$ Attitude, which was significantly positive in 2020 ($\beta = 0.47$; $p = 0.01$) but turned negative in 2021 ($\beta = -0.17$; $p = 0.01$), potentially indicating a shifting role of the communication context

in moderating attitudes. The dependent variable PKM was best explained in 2020, when the coefficient of determination R^2 reached 0.66 for Attitude and 0.02 for PKM. Model fit indices (GoF) remained at a high level throughout the period (Absolute GoF: 0.49-0.53; Relative GoF: 0.86-0.90), confirming the adequacy of the model specification.

Tab. 6

Assessment of the Structural Model

Relation		2019		2020		2021	
		coefficient	p-value	coefficient	p-value	coefficient	p-value
Attitude → PKM	H2	-0.09	0.383	-0.18	0.081	0.06	0.208
Power → Attitude	H1a	-0.16	0.000	-0.19	0.000	-0.20	0.000
Legitimacy → Attitude	H1c	-0.10	0.016	-0.06	0.094	0.01	0.866
Urgency → Attitude	H1b	0.79	0.000	0.76	0.000	0.70	0.000
SKOM → PKM		0.09	0.676	-0.28	0.088	0.05	0.325
Age → PKM		0.07	0.163	0.07	0.132	0.11	0.014
Gender → PKM		0.12	0.018	-0.01	0.954	0.02	0.727
SKOM x Attitude → PKM	H3	0.09	0.718	0.47	0.014	-0.17	0.012
Model diagnostics results							
N		384		504		500	
Average R^2		0.38		0.35		0.30	
Average communality		0.78		0.76		0.61	
Absolute GoF			0.53		0.49		0.39
Relative GoF			0.90		0.87		0.86
Average redundancy			0.26		0.23		0.17

GoF – Goodness of Fit measure

Figure 2 illustrates the tested structural model along with the results for each hypothesized relationship.

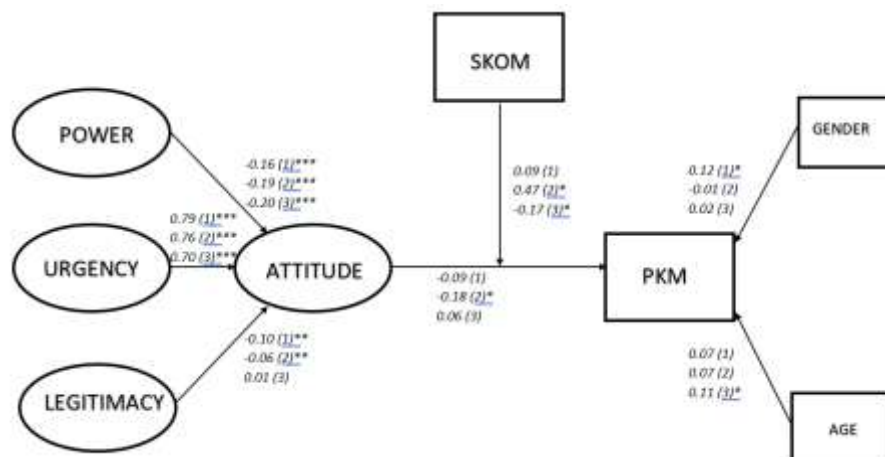


Fig. 2. Results of the PLS-SEM structural model

Table 7 reports the HTMT (Heterotrait-Monotrait) ratios used to assess the discriminant validity of constructs within the PL-SEM analysis. HTMT values below the threshold of 0.85 indicate satisfactory discriminant validity. In 2019, most inter-construct correlations were relatively low, with the notable exceptions of Legitimacy and Power (0.96), and Urgency and Attitude (1.01), both exceeding the recommended threshold. In 2020, the correlation between Legitimacy and Power decreased to 0.84, falling within acceptable limits, while the correlation between Urgency and Attitude remained high at 0.99. In 2021, the pattern persisted: the correlation between Legitimacy and Power increased slightly to 0.89, and Urgency and Attitude rose further to 1.04. These consistently high correlations suggest a strong and persistent association between these variable pairs over time, potentially indicating issues with discriminant validity.

Tab. 7

Heterotrait-monotrait ratio of correlations (HTMT)

Variable	Attitude	Power	Legitimacy	Urgency	SKOM	PKM	Age	Gender
2019								
Power	0.35							
Legitimacy	0.21	0.96						
Urgency	1.01	0.08	0.09					
SKOM	0.15	0.12	0.03	0.07				
PKM	0.04	0.11	0.05	0.09	0.16			
Age	0.07	0.17	0.19	0.03	0.07	0.04		
Gender	0.03	0.09	0.11	0.03	0.00	0.11	0.15	
SKOMxAttitude	0.55	0.24	0.09	0.40	0.92	0.12	0.09	0.01
2020								
Power	0.3553							
Legitimacy	0.1608	0.8402						
Urgency	0.9934	0.1125	0.1187					
SKOM	0.0763	0.0736	0.0437	0.0858				
PKM	0.0626	0.0853	0.0209	0.0037	0.1076			
Age	0.0422	0.1585	0.1671	0.0308	0.0285	0.0709		
Gender	0.0073	0.0519	0.0785	0.0176	0.0618	0.0157	0.1299	
SKOMxAttitude	0.6148	0.1686	0.0553	0.5326	0.8723	0.1377	0.0282	0.0265
2021								
Power	0.3283							
Legitimacy	0.1202	0.8851						
Urgency	1.0360	0.1083	0.0939					
SKOM	0.0120	0.0195	0.0239	0.0142				
PKM	0.0086	0.0016	0.0375	0.0305	0.0311			
Age	0.0590	0.1311	0.1329	0.0495	0.0314	0.1206		
Gender	0.0037	0.0241	0.0381	0.0122	0.0014	0.0027	0.1228	
SKOMxAttitude	0.6733	0.1793	0.0932	0.5424	0.8479	0.0132	0.0551	0.0175

5. DISCUSSION

5.1. Theoretical Implications

This study advances the theoretical application of Stakeholder Salience Theory (SST) (Mitchell, Agle, and Wood 1997) repositioning public transport users – specifically regional rail passengers – as active stakeholders whose self-perceived attributes influence their behavior within complex and evolving mobility systems. By operationalizing power, legitimacy, and urgency as individual-level constructs, we expand SST beyond its traditional organizational focus and demonstrate its applicability in the context of infrastructure use and public service adoption.

Moreover, this study contributes to the theoretical development of SST by incorporating the concept of moderation and temporal variation into the analysis of stakeholder behavior. Introducing intermodal connectivity as a moderating variable enriches the SST framework, showing that stakeholder perceptions do not operate in isolation but are shaped by the broader systemic environment. This integration acknowledges that the influence of perceived stakeholder attributes on behavior can be contingent upon infrastructural or contextual conditions, such as the quality-of-service integration across transport modes. Additionally, by examining how these relationships evolve across distinct time periods marked by socio-environmental disruption, the study extends SST's temporal dimension. This offers a theoretical foundation for more nuanced stakeholder models in public service contexts, especially those influenced by crisis, adaptation, and recovery processes.

5.2. Impact of the Pandemic and Practical Considerations

Pandemic impact is not unequivocal. While attitude is shaped by power and urgency in all three scenarios: pre-, during, and after pandemics, legitimacy was only significant before and during COVID-19. This turns out to be of importance also for Attitude impact on rail usage (PKM variable), which becomes insignificant after the pandemic. Interestingly, the negative relation between Attitude and rail usage has been reinforced by pandemics (path coefficient changes from -0.09 in 2019 to -0.18 in 2020).

The moderating effect of connectivity improvement becomes important under a pandemic scenario (coefficient of 0.47). What is most noticeable is, however, the change that occurred between 2020 and 2021. Negative coefficient of 0.17 observed in 2021 highlights the behavioral change. The same moderator now reverses the effect of the independent variable on the dependent variable. This could only be interpreted that while qualitative features of rail service (represented by SKOM variable) were a necessary condition for users during pandemics, they became a factor reducing the use of rail afterward. This demonstrates that the potential fear of becoming ill was a real concern, and streamlining rail service interconnectivity was, during pandemics, considered key in the selection of rail travel. The negative coefficient in the post-pandemic recovery period points to a significant change in customer expectations, revealing increasing disillusionment with the rail service's responsiveness to users' expectations and highlighting the evolving nature of user priorities.

The practical consideration for rail operators is inconclusive. We observed three different behaviors in our study. In pre-pandemic scenario the improvements to rail service were mostly ignored by train customers; during pandemic they became of crucial importance, while afterwards we observed reversal in customer behavior. This volatile behavior could be attributed to the rather slow process of the post-pandemic recovery of rail users' numbers.

Likely, most of the users who were pushed out of the rail service during pandemic never came back (as ridership data for those years suggests). And the remaining users were there because they had no real alternative. Under such circumstances, the connectivity cannot play its positive role since users have no real alternative anyway.

6. CONCLUSION

This study explored the evolving dynamics of public railway usage in the Pomeranian region from 2019 to 2021 through the lens of Stakeholder Salience Theory (SST). The analysis revealed a significant decline in daily PKM usage during the COVID-19 period, accompanied by an increase in moderate-frequency travel (3-4 times per week), suggesting a behavioral shift likely influenced by remote work policies and broader lifestyle changes. The frequency of PKM usage was positively associated with favorable assessments of the regional rail system's connectivity before the pandemic; however, this relationship reversed post-COVID, indicating increasing dissatisfaction among regular users.

Structural equation modeling confirmed that perceived urgency remained the most robust and consistent predictor of users' attitudes toward PKM throughout all three years, while power exerted a consistently negative influence. The effect of legitimacy on attitudes was only significant in 2019 and weakened thereafter. Notably, the interaction between perceived connectivity (SKOM) and user attitudes shifted from a positive moderator in 2020 to a negative one in 2021, suggesting increasing disillusionment with the rail system's responsiveness.

This study has several limitations. First, the analysis relies on cross-sectional data, which limits causal inference. Second, while care was taken to ensure consistent coding across years, subtle shifts in the meaning of constructs (particularly legitimacy) may have influenced how respondents interpreted key items over time. Finally, the sample may not fully capture the diversity of perspectives across all organizational types or sectors.

Future studies should consider employing longitudinal panel data to more rigorously trace changes in stakeholder perceptions and behaviors over time. Additionally, incorporating qualitative methods—such as interviews or focus groups—could enrich understanding of how users interpret concepts like power or legitimacy in the public transport context. Researchers should also explore expanding the SST model to include additional dimensions such as trust, service satisfaction, or perceived responsiveness, which may better capture the complexity of infrastructure-user relationships. Finally, addressing the noted issues with discriminant validity, particularly the overlap between urgency and attitude, will be critical for improving construct clarity and model robustness in subsequent studies.

References

1. Ajzen Icek. 1991. "The Theory of Planned Behavior." *Organizational Behavior and Human Decision Processes* 50(2): 179-211. Elsevier.
2. Ali Nazam, Nakayama Shoichiro, Yamaguchi Hiromichi. 2023. "Using the Extensions of the Theory of Planned Behavior (TPB) for Behavioral Intentions to Use Public Transport (PT) in Kanazawa, Japan." *Transportation Research Interdisciplinary Perspectives* 17(January): 100742. Elsevier. DOI: 10.1016/J.TRIP.2022.100742.

3. Boesso Giacomo, Kumar Kamalesh. 2016. "Examining the Association between Stakeholder Culture, Stakeholder Salience and Stakeholder Engagement Activities: An Empirical Study." *Management Decision* 54(4): 815-31. Emerald Group Publishing Ltd. DOI: 10.1108/MD-06-2015-0245.
4. Bubeliny Oliver, Kubina Milan, Varmus Michal. 2021. "Railway Stations as Part of Mobility in the Smart City Concept." *Transportation Research Procedia* 53(January): 274-81. Elsevier. DOI: 10.1016/J.TRPRO.2021.02.039.
5. Derrick Ben, Anselma Dobson-Mckittrick, Toher Deirdre, White Paul. 2025. "Quantitative Methods Inquires 1 Test Statistics for Comparing Two Proportions with Partially Overlapping Samples."
6. Downey Jordan, Kenny Avi. 2024. "Repeated Sampling of Different Individuals but the Same Clusters to Improve Precision of Difference-in-Differences Estimators: The DISC Design." Available at: <https://arxiv.org/pdf/2411.17905>.
7. Fieller E.C., H.O. Hartley, E.S. Pearson. 1957. "Tests for Rank Correlation Coefficients. I." *Biometrika* 44(3-4): 470-81. Oxford Academic. DOI: 10.1093/BIOMET/44.3-4.470.
8. Geurs Karst T., Lissy La Paix, Sander Van Weperen. 2016. "A Multi-Modal Network Approach to Model Public Transport Accessibility Impacts of Bicycle-Train Integration Policies." *European Transport Research Review* 8(4): 1-15. Springer Verlag. DOI: 10.1007/S12544-016-0212-X/TABLES/6.
9. Hair Joseph F., Jeffrey J. Risher, Marko Sarstedt, Christian M. Ringle. 2019. "When to Use and How to Report the Results of PLS-SEM." *European Business Review* 31(1): 2-24. Emerald Group Publishing Ltd. DOI: 10.1108/EBR-11-2018-0203/FULL/PDF.
10. Hussain Hussain Dhafir. 2020. "Predicting the Commuter's Willingness To Use LRT, Utilising the Theory of Planned Behaviour and Structural Equation." *Journal of Applied Engineering Science* 18(3): 403-12. Institut za Istrazivanja. DOI: 10.5937/JAES18-27013.
11. Ibrahim Muhammad Faishal. 2003. "Improvements and Integration of a Public Transport System: The Case of Singapore." *Cities* 20(3): 205-16. Elsevier Ltd. DOI: 10.1016/S0264-2751(03)00014-3.
12. Koleva Petya, Yusuf M. Sidani, Maureen Meadows. 2022. "Stakeholder Salience Formulation in a Non-Western Context: Who, What and Why Actually Matters for the Organization?" *Academy of Management Proceedings* 2022(1). Academy of Management. DOI: 10.5465/AMBPP.2022.12281ABSTRACT.
13. Madha Ahmed, Ali Dawod Salman, Hussein Dhafir Hussain, Nazri Borhan, Riza Atiq O.K. Rahmat. 2016. "Analysis of Travel Behaviour in Petaling Jaya, Malaysia: An Application of the Theory of Planned Behaviour." *Archives of Transport* 38(2): 29-38. Warsaw University of Technology. DOI: 10.5604/08669546.1218791.
14. Mitchell Ronald K., Bradley R. Agle, Donna J. Wood. 1997. "Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts." *Academy of Management Review* 22(4): 853-86. Academy of Management Briarcliff Manor, NY. DOI: 10.5465/AMR.1997.9711022105.
15. Neville Benjamin A., Simon J. Bell, Gregory J. Whitwell. 2011. "Stakeholder Salience Revisited: Refining, Redefining, and Refueling an Underdeveloped Conceptual Tool." *Journal of Business Ethics* 102(3): 357-78. Springer. DOI: 10.1007/S10551-011-0818-9/METRICS.

16. Pérez-Guerrero Edsaúl Emilio, Miryam Rosario Guillén-Medina, Fabiola Márquez-Sandoval, José María Vera-Cruz, Martha Patricia Gallegos-Arreola, Manuel Alejandro Rico-Méndez, José Alonso Aguilar-Velázquez, Itzae Adonai Gutiérrez-Hurtado. 2024. "Methodological and Statistical Considerations for Cross-Sectional, Case-Control, and Cohort Studies." *Journal of Clinical Medicine* 13(14): 4005. Multidisciplinary Digital Publishing Institute (MDPI). DOI: 10.3390/JCM13144005.
17. Pshinko Oleksandr, Tatiana Charkina, Larysa Martseniuk, Oleksandra Orlovska. 2025. "Hubs as a Key Tool for Improving the Quality of the Service and Development of Multimodal Passenger Traffic." *Transport Problems* 17(1): 201-214. DOI: 10.20858/tp.2022.17.1.17.
18. Pucher John, Ralph Buehler. 2009. "Integrating Bicycling and Public Transport in North America." *Journal of Public Transportation* 12(3): 79-104. Elsevier. DOI: 10.5038/2375-0901.12.3.5.
19. Raha Aved, Ilir Hajdini, Josef Windsperger. 2021. "A Multilateral Stakeholder Salience Approach: An Extension of the Stakeholder Identification and Salience Framework." *Industrial Marketing Management* 97(August): 1-9. Elsevier. DOI: 10.1016/J.INDMARMAN.2021.06.008.
20. Reynolds Scott J., Frank C. Schultz, David R. Hekman. 2006. "Stakeholder Theory and Managerial Decision-Making: Constraints and Implications of Balancing Stakeholder Interests." *Journal of Business Ethics* 64(3): 285-301. Springer. DOI: 10.1007/S10551-005-5493-2/METRICS.
21. Saleh Silvia, Anusree Saha Tithi, Nazmus Sakib, Tonmoy Paul, Nafis Anwari, Shohel Amin. 2023. "Theory of Planned Behavior to Understand Commuter's Perception towards Mass Rapid Transit in Dhaka City, Bangladesh." *Sustainability* 15(14): 11270. MDPI AG. DOI: 10.3390/SU151411270.
22. Shaaban Khaled, Amro Maher. 2020. "Using the Theory of Planned Behavior to Predict the Use of an Upcoming Public Transportation Service in Qatar." *Case Studies on Transport Policy* 8(2): 484-91. Elsevier. DOI: 10.1016/J.CSTP.2019.11.001.
23. Torabi K.F., Yashar Araghi, Niels van Oort, Serge Hoogendoorn. 2022. "Passengers Preferences for Using Emerging Modes as First/Last Mile Transport to and from a Multimodal Hub Case Study Delft Campus Railway Station." *Case Studies on Transport Policy* 10(1): 300-314. Elsevier. DOI: 10.1016/J.CSTP.2021.12.011.
24. Venturini Sergio, Mehmet Mehmetoglu. 2019. "PLSSEM: A Stata Package for Structural Equation Modeling with Partial Least Squares." *Journal of Statistical Software* 88(1): 1-35. American Statistical Association. DOI: 10.18637/JSS.V088.I08.
25. Wood Donna J., Ronald K. Mitchell, Bradley R. Agle, and Logan M. Bryan. 2021. "Stakeholder Identification and Salience After 20 Years: Progress, Problems, and Prospects." *Business and Society* 60(1): 196-245. SAGE Publications Ltd. DOI: 10.1177/0007650318816522.
26. Zhang Xinyuan, Diyi Liu, Yuning Wang, Huibin Du. 2021. "Behavioral Intentions of Urban Rail Transit Passengers during the COVID-19 Pandemic in Tianjin, China: A Model Integrating the Theory of Planned Behavior and Customer Satisfaction Theory." *Journal of Advanced Transportation* 2021(1): 8793101. John Wiley & Sons, Ltd. DOI: 10.1155/2021/8793101.



Scientific Journal of Silesian University of Technology. Series Transport is licensed under a Creative Commons Attribution 4.0 International License