

The Perceived Impacts of Transnational Highway Development: A Case Study of R3A Highway in Phayao Province, Thailand.

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Abstract—Transnational highways have increasingly complemented trade agreements as instruments of economic integration. Drawing on theoretical background of social exchange theory, social disruptive theory, and social carrying capacity theory, several previous studies assumed that highways usually induce social, environmental, and political changes and play an important role in economic development. Therefore, this study aims to investigate the residents' perceived impacts toward R3A Highway development in Phayao province, Thailand. 400 questionnaires from randomly selected residents from Phu Sang, Chiang Kham, Chun, and Dok Khamtai districts were analyzed. A confirmatory factor analysis and regression analyses were conducted. The result revealed that the majority of residents are supportive of transnational highway development. Economic and environmental impacts were strong predictors for support for R3A Highway development, while social impacts were found insignificant and political impacts had a negative influence on the highway project.

Keywords—Highway Development, R3A Highway

I. INTRODUCTION

SINCE the ASEAN-China Free Trade Area (ACFTA) came into effect on January 1st, 2010, it opened up a combined market of 1.9 billion people, accounting for a combined GDP of close to six trillion US dollars and a total trade volume of 4.5 trillion dollars. Over the past five years, economic development in the area has come to be seen in terms of ASEAN-China economic integration. This is because, according to former ASEAN Secretary-General Surin Pitsuwan, China offers a huge and expanding market for all ASEAN Member States. Furthermore, ASEAN and China make up a strong market, and their commodities, tourism industry, and services sector will benefit a great deal from ASEAN connectivity with China (Chan, 2011) [10]. As Bangkok will serve as a gateway to new markets for Chinese exports among South East Asia's 600 million people, transnational highway projects that link China and Thailand become pre-eminent [1-3]. R3A Highway (Fig. 1) is a part of Kunming–Bangkok Expressway and is one of the new highways serving the North-South Economic Corridor, which stretches over 2,000 kilometers [4].

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Fig.1 R3A International Expressway Network (Chaingrai Times, 2012)

The transnational highway, which was funded by Asian Development Bank (ADB), links Thailand with Lao PDR and Yunnan Province of China. It is one of the Master Plan on ASEAN Connectivity in response to ASEAN's need to be better connected physically, institutionally, and in terms of people-to-people contact (Chan, 2011) [10]. Since its opening on March 21st of 2008, this particular highway is quickly becoming the most important route in trading, investment and service in the region. Different infrastructure projects receive varying levels of support, and transnational highways are no exception. While the rationale of the government in developing R3A Highway based on the theoretical understanding that transportation infrastructure improvements play a major role in development and are beneficial to all nearby settlements, there is still no consensus on the developmental role highway development project (Keeble, Owens, & Thompson, 1982; Eagle & Stephanedes, 1987[14]; Forkenbrock [16] & Foster, 1990; Foster, Forkenbrock, & Pogue, 1991 [18]; Loo, 2000, 2002 [25-26]). Although a highway is an important component of people's living

environment, it is imperative for us to understand the users' perceptions of and response to transportation infrastructure development projects.

Despite there are many research studies on the economic benefits of highway construction (Botham, 1980; Forkenbrock & Foster [16], 1990; Dupuy, 1996 [13]; Linneker, 1996 [24]), empirical research on perceptions and response of the local community towards a major transnational highway development, especially in Great Mekong Subregion (GMS), is minimal (Bamberger, 1985) [3]. Hence, to contribute to the existing literature, the study adopts the theoretical model based on social exchange theory, social disruptive theory, and social carrying capacity theory in examining residents' perceptions of economic, social, environmental, and political impacts of R3A Highway development project in Phayao, Thailand. Specifically, the study addressed the following research questions:

1. Were the perceived economic, social, environmental, and political impacts a predictor for R3A Highway development? Moreover, which is the best predictor?

2. Were there any differences in perceived economic, social, environmental, and political impacts of R3A Highway development associated with Phayao resident's district, gender, age, level of education, occupation, and level of income?

LITERATURE REVIEW

According to National Cooperative Highway Research Program, it is very difficult to accurately assess the social and economic effects of transportation investments on communities. This difficulty stems from insufficient methods, tools, and techniques for the scale, context, and complexity of the projects (Forkenbrock & Weisbrod, 2001) [17]. Research on infrastructure and its impacts has rarely focused on transnational highways (Perz, 2012) [35]. While it is undeniable that infrastructure projects such as R3A Highway generate economic growth (Bourguignon [8] & Pleskovic, 2008) (Straub, 2008) [38], Highways also bring problematic social consequences (Robinson, 2001 [36]; Mendoza [29], Perz, Schmink, & Nepstad, 2007) and catalyze amount of negative ecological outcomes (e.g. Coffin, 2007; Forman et al., 2003). Moreover, there are few studies that examined the relationship between transportation infrastructure investment and political impacts. However, there are number of studies that explore the relationship between residents' perceptions of economic, social, environmental, and political impacts of development projects. A review of related literature indicates that three major theories were appropriate for explaining residents' perceptions toward the impacts of transnational highway development: namely, social exchange theory, Social disruptive theory, and social carrying capacity theory.

Social Exchange Theory

The social exchange theory (SET) is a social psychological and sociological perspective that describes

social change as a process of negotiated exchanges between individuals or groups. This theory, dating back to the early 1920s (Malinowski, 1922) [27], rooted in economic theory and modified by Thibaut and Kelly (1959) for the study of social psychology of groups, focuses on the perceptions of the relative costs and benefits of relationships and their implications for relationship satisfaction. According to Cropanzano & Mitchell (2005) [12], SET is one of the most influential conceptual paradigms in organizational behavior. It suggests that people engage in interaction or reciprocate with other people because they expect to receive benefits or incentives from the other party (Blau, 1964 [6]) or that it generates obligations between the parties (Emerson, 1976 [15]). Hence, human relationships are formed by the use of subjective cost-benefit analysis creating mutual obligations, reciprocity, or repayment over time (Cropanzano & Mitchell, 2005 [12]).

In a political context, the outcomes of a social exchange relationship between the government and citizens influence political trust. Government institutions create policies and in return, they receive trust from those individuals who are satisfied of these policies, and cynicism and mistrust from those who are dissatisfied. Trust is a relational construct (Markova & Gillespie, 2008) [28] that is inherent to SET (Blau, 1964). Trust between actors (e.g. residents and government) is fundamental in the emergence and maintenance of social exchanges between two parties (Cropanzano & Mitchell, 2005) [12]. In other words, political trust (i.e. residents' trust in government) is the belief that the political system or some of it will produce preferred outcomes even in the absence of constant scrutiny. Studies on political trust are driven by the importance of linking citizens to institutions, the desire to achieve good governance, and the need to gain public support for development (Scheidegger & Staerkle, 2011) [37]. Political trust is important because it conveys a message to the governing elite whether or not their policy decisions conform to the normative expectations of the governed.

Social Disruption Theory (SDT)

Social disruption theory is developed based on rural sociology thinking. The theory indicates that communities experiencing rapid growth typically enter a period of generalized crisis and loss of traditional routines and attitudes. The crisis affects individuals, whose mental health, worldviews, ways of behaving, and social relationships and networks may all be affected (Park & Stokowski, 2009) [32]. Based on this assumption, several scholars (Perdue [33], Long, & Kang, 1995) further apply it in many development contexts, positing that infrastructure development project or tourism will cause social disruption to the community. Disruption influences are mainly categorized as crime, bankruptcy, traffic congestion and other social costs (Lee & Back, 2009) [23].

However, residents in communities experiencing rapid growth will initially express negative attitudes toward tourism development (while experiencing the transitional stress of rapid development), followed by positive attitudes once they have adapted to the new situation by increasing public services and improving community infrastructure and economic conditions. Several studies have provided support for the SDT. For instance, Lee and Back (2003) [22] reported

that residents' concerns about social impacts of a casino were significantly exaggerated before the casinos opened. However, once residents experienced such development, their perceptions of negative social impacts were low.

Social Carrying Capacity Theory

The concept of social carrying capacity was adapted from range management and was applied to recreation management in the early 1960s. The focus is on determining the level of use beyond which impacts exceed acceptable levels specified by evaluative standards. Allen, Long, Perdue [2], and Kieselbach (1988) asserted that each community has a certain capacity to absorb tourism development. Development beyond the level of carrying capacity will result in negative social and environmental impacts as well as negative economic impact. A social carrying capacity theory postulates that residents express positive attitudes at an initial stage of tourism development followed by negative attitudes after the community reaches a certain level of acceptable change, or carrying capacity (Perdue, Long, & Kang, 1999) [34].

From the above literature review, it is clear that in assessing transnational highway infrastructure projects related impacts to a host community, the social exchange theory, social disruptive theory, and social carrying capacity theory are appropriated. This is because these theories has been used predominately in several past studies and accepted as accurate predictors. Therefore, the theoretical tested, as shown in Figure 2, involved five constructs: perceived economics impacts, perceived social impacts, perceived environmental impacts, perceived political impacts, and support for R3A Highway development.

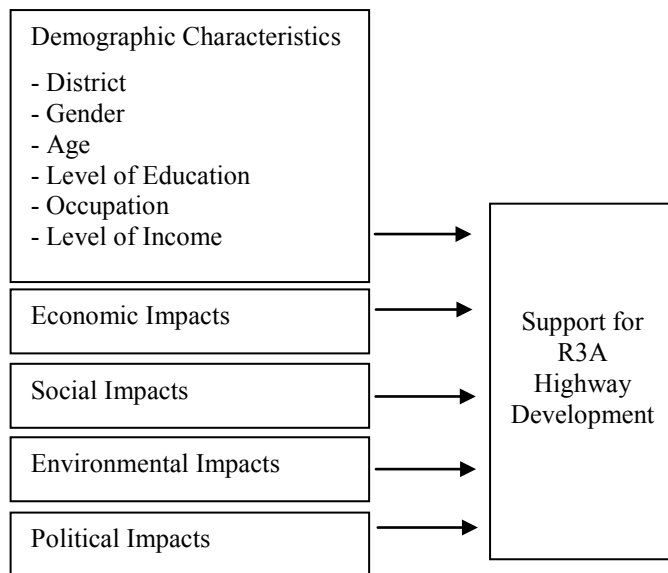


Fig. 2 The Proposed Theoretical Model of Residents' Perceived Impacts toward R3A Highway Development

II. METHODOLOGY

Study Location and Population

Phayao province is the research site based on its strategic location on R3A Highway. Highway 1021, which is 100.157 km (62.23 mi.) in length and forms a link in the Kunming–Bangkok Expressway, connects the study areas (Phu Sang, Chiang Kham, Chun, and Dok Khamtai) with the major cities of Chiang Khong and Chiang Rai. This particular highway is very important logistically to the business in the region due to the fact that it is one of the most suitable parts of highway in constructing logistics hubs and warehouses that will supply goods and products travelled through Kunming–Bangkok Expressway (Hotrawaisaya, Chandraprakaikul, & Nanthi, 2014).

Therefore, the study population is the household members of Phu Sang/Chiang Kham/Chun/Dok Khamtai districts. Specifically, this target population consists of residents who are over 18 years old in the community of Phu Sang, Chiang Kham, Chun, and Dok Khamtai in Phayao province, Thailand.

Sampling Procedure and Data Collection

The data for this study were collect by a stratified sampling method based on population size. A stratified random sample was used to reflect the diverse geographical distribution of the residential area of the community (Zikmund, 1997) [43]. First, the study areas were identified, and then the sample size for each district was determined by the proportional population of each city/town over the total population of the research area. The sample size was 400, with a sample error of 5 percent and a confident level of 95 percent (Yamane, 1973) [42].

The data were collected during March–April 2015 using a structured self-administered questionnaire that was hand-delivered by the authors and research team from Ministry of Social Development and Human Security. The interviewer provided a brief explanation of the study to the interviewee and invited them to participate in the study. To minimize possible bias due to interviewer-participant interaction, it was communicated to participants that their partaking is voluntary and anonymous and they were encouraged to state their own personal opinion as truthfully as possible. Only one person in each household was invited to participate, as people from the same household often hold similar views. As a result, 400 completed questionnaires were retained and used for subsequent data analysis.

Survey Instrument

A self-administered questionnaire was developed for the purpose of this study. The questionnaire comprised two main sections. The first concentrated on generating a demographic profile of the respondents including gender, age, level of education, occupation, and level of income. The second section contained statements assessing resident members' perceptions of the impact that R3A Highway development may have in their community. Participants were asked to rate each statement on a nine-point Likert-type scale. A value of one denoted a negative response (strongly disagree) and a nine represented a favorable response (strongly agree). Some items were reverse coded during data entry for consistency.

The questionnaire was then pilot tested with a series of on-site interviews ($n = 30$) to ensure its clarity, reliability and comprehensiveness. The pilot study allowed for the opportunity to gain feedback on the clarity of the directions, the chance to check the face validity of the statements, and establish a baseline for the length of time needed to complete the questionnaire. As a result, modifications from the original instrument were made as a Cronbach reliability test was performed to further stabilize the questionnaire.

III. RESULTS AND DISCUSSION

The data were first analyzed to present a description of the participants in the study and provide a description, computed as averages, for each statement on the survey instrument. The remainder of the analysis of the data tested between perceived economic, social, environmental, and political impacts and support for R3A Highway development in Phayao through exploratory factor analysis (EFA). The purpose of the EFA was to group together correlated variables (Tabachnick & Fidell, 2001) [39]. Then, a standard multiple regression analysis allowed for an examination of which perceived impacts, economic, social, environmental, or political, were significant predictors of support for R3A Highway development. Finally, a series of analysis of variance (ANOVA) tests were used to examine any differences in support for the participant demographics.

TABLE I
DEMOGRAPHIC CHARACTERISTICS OF
RESPONDENTS.

Demographic	Sample (N = 400)	Percentage
Gender	Male	55.0
	Female	45.0
Age	Less than 20	17.8
	20-29	12.3
	30-39	14.0
	40-49	19.0
	50-59	19.3
Level of Education	60 and Above	17.8
	Elementary education	38.0
Occupation	High school education	43.0
	Bachelor's degree	14.8
	Master's degree	1.5
	Others	2.8
Level of Income (32 Baht = US\$1)	Government employee	11.3
	Shop owner/keeper	7.0
	Private company employee	3.3
	Student	18.0
	Housewife	7.3
	Labor/Worker	32.0
	Others	21.3
	Less than 5,000	46.5
5,001-10,000	37.5	
10,001-20,000	10.8	
20,001-30,000	2.8	
30,001-40,000	1.3	
40,001-50,000	0.5	
More than 50,000	0.8	

Participant Demographics

Table I represents participant demographics. There majority of the participants were aged 40–60 years of age, comprising approximately half of the total respondents. There was a roughly even distribution of men and women with 55% for men and 45% for women, respectively. Most of the respondents were married (66.8%), while 33.3% were still single. The average income of the household surveyed reported at from less than 5,000 Baht a month (46.5%) to 5,001-10,000 Baht a month (37.5%). With regard to educational background, 43% of the respondents were high school diploma holders, while 38% attained elementary education level.

Description of Individual Measurement Items of Perceived Impacts

Respondents were requested to demonstrate their perceptions toward the impact of Highway R3A development on their community by using the 9-point Likert-type scale for each statement (1 = strongly disagree, 5 = neutral, and 9 = strongly agree). Factor analysis was conducted to assess the dimensionality of the 48 items. All exploratory factor analyses were initially performed using the principal axis factoring method and Varimax rotation with the Kaiser Normalization. The Bartlett test of sphericity was significant (Chi-square = 13378.947, $p < 0.000$) (Bartlett, 1954) [5]. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was computed to quantify the degree of intercorrelations among the variables, and the results indicate an index of 0.935. Since the KMO measure of sampling adequacy was larger than 0.6, it showed that the use of factor analysis was appropriate (Kaiser, 1970; 1974) [19-20].

A cut-off factor loading of 0.3 and an eigenvalue greater than or equal to 1 were used (Pallant, 2007) [31]. The principal component analysis (with varimax rotation) of the 48 items resulted in a four-factor solution that explained 60.30% of the total variation (explaining 33.86%, 16.4%, 6.27%, and 3.76% of the variance respectively). Each of the items loaded strongly on one of the four factors. An inspection of the screeplot revealed a clear break after the fourth component. Using Cattell's (1996) scree test, it was decided to retain four components for further investigation. The four-component solution explained a total of 60.30% of the variance.

Cronbach's internal consistency reliability is the most widely used reliability test methods. Nunnally and Bernstein (1994) [30] recommended that a score of 0.7 or higher is desired reliability while 0.6 or higher is an acceptable reliability coefficient for research at the early stage of the scale development. Cronbach's alpha coefficients for the four factors ranged from 0.51 (lowest) to 0.81 (highest) with a total scale reliability of 0.86. This indicates that the variables exhibited a strong correlation with their factor grouping and thus were internally consistent.

TABLE II.
PERCEIVED IMPACTS OF R3A HIGHWAY
DEVELOPMENT

Variables	No. of Items	Eigenvalue	M	SD	α
Economic Impacts	14	33.865	6.39	1.35	0.88
Social Impacts	9	16.404	6.24	1.41	0.82
Environmental Impacts	10	6.274	6.53	1.38	0.82
Political Impacts	11	3.761	6.20	1.59	0.89

Table 3 illustrates the items, factor loadings, eigenvalues, Cronbach's alpha, means, and standard deviations for each item in the model. The first factor labeled 'socio-cultural benefits' explained 37.55% of the total variance with a reliability coefficient of 0.78 and mean of 3.82. This factor contained eight perception items including

cultural activities and facilities and quality of life. The second factor named as 'economical benefits' accounted for 21.37% of the variance with a reliability coefficient of 0.89 and mean of 3.66. This factor comprised eight items such as tax revenues, employment, income, and investment/business. The third factor, 'environmental impacts' explained 10.78% of the total variance with a reliability coefficient of 0.64 and mean of 3.84. This factor incorporated eight items related to improvement of roads and other public services, urbanization and better quality of buildings and city planning. Furthermore, the mean value of each factor was examined in this study to examine the overall hosts' attitudes toward tourism.

TABLE III
PERCEIVED IMPACTS OF R3A HIGHWAY
DEVELOPMENT REGRESSION MODEL

Variable	B	SE B	β	Sig.
Economic Impacts	.370	.420	.254	.000*
Social Impacts	.185	.103	.132	.115
Environmental Impacts	.503	.114	.353	.000*
Political Impacts	-.201	.073	-.762	.006**

$R^2 = .349$; $F = 52.895$

*Significance at the $p < .001$

**Significance at the $p < .010$

Predictors of R3A Highway Development

A standard multiple regression analysis was used next to examine relationships between the resulting factors established in the residents' perceived impacts and support for R3A Highway development. The four impacts were the independent variables and support for R3A Highway development was the dependent variable. The model can be found in Table 3 and Figure 2. Economic Impacts, Social Impacts, Environmental Impacts, and Political Impacts attributed significantly to predicting support for R3A Highway development. The total variance explained by the model as a whole was 34.9%, $F(4, 399) = 52.89$, $p < .001$. The F-ratio of 52.89 was significant ($p < .000$), indicating that the results could hardly have occurred by chance.

It is observed that the perceived social impacts were not a significant predictor. However, the beta values for the perceived economic and environmental impacts were positive. Therefore, as the perceived economic and environmental impacts increase, so does further support for R3A Highway development project. In addition, the negative beta value for the political impacts reflects a decreased support for R3A Highway development in the areas. In other words, the more political impacts the residents' perceived obtaining from R3A Highway development, the more likely they are to reject the possible transnational highways project.

Differences in R3A Highway Development Support and Participant Demographics

To answer the second research question, a series of one-way analysis of variance (ANOVA) were performed to assess differences in the sampled population's demographic and support for R3A Highway development in the Phayao,

Thailand. The demographic variables of gender, age, length of residence, and highest level of education completed were independent variables and the support for R3A Highway development was the dependent variable for each ANOVA.

As the results are illustrated in Table 4, there were no significant differences found between the individuals in gender, age, occupation, and level of income on the support for R3A Highway development. However, there was a statistical significant at the $p < .05$ level in district and level of education. Despite the impact of level of education reaching statistical significance, the actual difference in mean scores between the groups was quit small. The effect size, calculated using eta squared, was .02 (Cohen, 1988) [11]. Post-hoc comparison using Tukey HSD test indicated that the mean score for elementary education ($M = 7.27$, $SD = 1.80$) was significantly different from bachelor's degree ($M = 6.37$, $SD = 1.95$). On the other hand, the impact of district on the support R3A Highway development was statistically significant and the difference in mean scores between districts was quit moderate (the effect size of .06) (Cohen, 1988). The test indicated that the mean score for Phu Sang ($M = 6.18$, $SD = 2.34$) was significantly difference from Dok Khamtai ($M = 7.16$, $SD = 1.79$), Chun ($M = 7.53$, $SD = 1.75$), and Chiang Kham ($M = 6.94$, $SD = 1.70$). Although not statistically significant, Phu Sang in general were less likely to support the development of R3A Highway development project than other districts.

From the findings, the regression analysis supported the social exchange theory, social disruptive theory, and social carrying capacity theory. The results also showed that the environmental impacts appear to have the greatest influence on whether Phayao resident members support further R3A Highway development. This may be attributed directly to the population sampled for this study because resident members rely heavily on R3A Highway as a main transportation route and source of income. As a result, they may be less concerned about social impacts because these are more widely felt by residents who do not work and live in the area, both positive and negative impacts (Lee & Back, 2003) [22].

While economic impacts of R3A Highway development was also an important factor in predicting support for transnational highway development, however, a negative relationship is observed for political impact on encouraging transnational highway development project. In other words, the more political impacts (political conflict or national security concerns) the resident members perceived obtaining from R3A Highway development, the more likely they are to decrease the support for transnational highway development.

TABLE IV
ANALYSIS OF VARIANCE FOR SUPPORT FOR R3A
HIGHWAY DEVELOPMENT

Source	<i>df</i>	<i>F</i>	<i>p</i>
District	3	8.870	.000*
Gender	1	4.960	.027
Age	5	.900	.481
Level of Education	4	4.524	.001*
Occupation	6	1.964	.070
Level of Income	6	.921	.479

*Significance at the $p < .05$

IV. CONCLUSION

This study assessed the perceived impacts of transnational highway development project by examining Phayao residents' perceptions toward R3A Highway development in their communities. The findings of the study have both theoretical and applied implications in community participation and development studies. The impact items covered in the study were related to economic, social, environmental, and social aspects. While social impacts are not the main concerns, the host communities possess positive attitudes toward economic, environmental and political impacts and clearly expecting that the R3A Highway development would result in an overall better quality of life and political empowerment.

Although one particular community (Phu Sang) has more concerned than the others regarding the total benefits of the development, the findings shown that all respondents, to some extent, are satisfied with R3A Highway development. The benefits of understanding hosts' perceptions can help local authorities and policy makers better assess the host community's perceptions of transportation infrastructure development. Furthermore, it is encouraging to see that the residents are aware of the many impacts of the economic, social, environmental, and political benefit of R3A Highway development while at the same time understand that it can have detrimental effects on the communities. The findings reveal that the revenues brought by transnational highway development are not only reaped by the government but the benefits seem to have spread around among residents of the communities along R3A Highway.

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