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FACTORS AFFECTING THE INVESTMENT DECISION ON THE ROAD TRAFFIC INFRASTRUCTURE DEVELOPMENT: A CASE STUDY IN VIET NAM

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Abstract: This article is aimed at studying a number of factors affecting the investment decision on the development of road-traffic infrastructure funded by the state budget in Vietnam. The results have shown that investment in road-traffic infrastructure in Vietnam is one of the priority investment areas of the country to create a premise for national economic development. Therefore, the State budget for investment in road traffic infrastructure development is relatively large besides other mobilized sources of capital. Also, the results of the study have pointed out that the appropriateness of the project towards the national development plan, expected outputs of the project (traffic volume, impact of the project on households), the natural and socio-economic conditions of the localities where the investment projects are going to be implemented are the factors affecting the investment decisions on the road traffic infrastructure development funded by the State budget in Vietnam.

1. Rationale

Investment in road traffic infrastructure development is a part of investment development which refers to the use of existing capital to carry out road traffic infrastructure activities such as construction of road works, stations, parking lots, stopovers and other auxiliary works for road traffic services and road safety corridors in order to increase or create additional physical assets, production, jobs and development.

Investment in road traffic infrastructure development is a premise for economic growth because road traffic infrastructure is one of the most important types of material-technical infrastructure with the economic development of each country or region. Investment in road traffic infrastructure development will open up opportunities for regional or national development, especially in remote and isolated areas. In addition, investment in the construction of road traffic infrastructure is part of the overall social investment; therefore, like other types of investments, investment in road traffic infrastructure development also has direct effects on economic growth.

State capital includes state budget; national bonds, government bonds, local government bonds; official development subsidies, preferential loans from donors, capital from occupation development funds; investment development credit capital of the State; credit capital guaranteed by the Government; loans secured by assets

Key words: Infrastructure, road traffic, road traffic infrastructure development Vietnam, investment decision

of the State; investment development capital of State enterprises; land use right value.

It is the position and importance of investment in road traffic infrastructure development funded by state budget that make the investment decision in road traffic infrastructure development become critical to the success or failure of projects; thereby, affecting the country's socio-economic development. Therefore, the study was conducted to analyze certain factors contributing to the investment decision in the development of road traffic infrastructure funded by state budget in Vietnam. The research results can help policy makers and managers decide on the correct investment projects and help agencies better prepare for their projects.

2. Research overview

Investment in road traffic infrastructure development has received the attention of not only policy-makers but also researchers from around the world under different perspectives and approaches. Barnard Myers and Thomas Laursen (2008) looked into this issue understate management of investment in infrastructure construction funded by the state budget; whereas Alfrefo M Pereira and Andraz (2010) and Glen Weibrod (2009) directed their studies on the effects of investment in transport towards economic development. Thereby, indicating the need for investment in transportation systems in countries (Susan Handy, 2005).

Meanwhile, Robbins and Coulter (1996), Dunning John (1997), Gilomre *et al.* (2003), Phung Xuan Nha (2001), Karim and Azman-Sainib 2012, Le Hoang Ba Huyen (2012), Le Hoang Ba Huyen *et al* (2013) indicated different groups of factors affecting the investment decision based on various approaches. Almost all of those studies agree that in order to obtain investment decisions, projects must have certain advantages, especially considering the cultural, political, and socioeconomic conditions.

3. Research scope and methods

3.1. Research methods

3.1.1. Data collecting method

The statistics of investment capital for road traffic infrastructure development has been collected from the final report of the Ministry of Transportation.

Also, the study has collected pre-feasibility reports of projects from the Ministry of Planning and Investment and Ministry of Finance. These include invested projects and non-invested projects; randomly selecting projects approved during the research period from 2012 to 2016 to collect data for the analysis of factors affecting the investment decision. 214 projects / phases of the project were collected as the basis for the analysis, including 103 projects / phases that were not invested and 111 projects / phases that were invested.

After collecting data from such projects, the researcher dissolved data basing on: estimated length of project implementation, expected traffic volume after project commencement, project appropriateness with state and local planning, the project

impacts on households, natural conditions affecting project implementation, etc. Then, the data would be inserted into excel software to perform statistical operations.

3.1.2. Data analyzing method

In this study, the researcher used the descriptive statistical method and binary logistic regression to perform the analysis.

The study used binary logistic regression model to estimate the probability of change in the investment decision in road traffic infrastructure development funded by the state budget, and to analyze the impact of factors on investment decisions for investment projects in road traffic infrastructure development funded by the state budget.

The Binary Logistic Regression method uses binary dependent variables to estimate the likelihood-ratio of an event with the given information of independent variables. The information collected for a dependent variable is an event that may occur (the dependent variable Y now has two values of 0 and 1, 0 means no event happens and 1 means an event happens). And obviously the information on independent variables X_1, X_2,..., X_k is also included. Based on these binary dependent variables, a procedure is used to predict the likelihood-ratio of an event according to the rule if the predicted likelihood-ratio is greater than 0.5 (default cut-off point), the predicted result will be "Yes", otherwise it is "No".

$$1 - P = Prob(Y = 0) = 1 - \frac{e^Z}{1 + e^Z} = \frac{1}{1 + e^Z}$$

P is the likelihood-ratio so that $Y = 1$ (the condition for an event to occur) when independent variables have specific value. Hence, the ratio for an event not to occur is calculated by:

$$1 - P = Prob(Y = 0) = 1 - \frac{e^Z}{1 + e^Z} = \frac{1}{1 + e^Z}$$

In which, $Z = B_0 + B_1X_1 + B_2X_2 + ... + B_kX_k$

The regression coefficients are estimated by using Maximum Likelihood method.

**) Research model*

Dependent variable (Y): investment decision in road traffic infrastructure developmentfunded by state budget; Y gets value 1 when investment is decided and gets value 0 when not invested.

Independent variables:

+) Socioeconomic Conditions (DKKTXH): This is an external factor that affects the investment decision. (Quang Phuong, Pham Van Hung, 2012)

+) Socioeconomic Development Planning (QH): From the perspective of Tu Quang Phuong and Pham Van Hung (2012), the projects deployed for investment development should be in line with the socioeconomic development planning the country and localities. If a project is in line with the socioeconomic development plan of localities, the probability of being approved will increase and vice versa.

+) Project impacts on households (HD): From the perspective of Phung Xuan Nha (2012), Tu Quang Phuong, Pham Van Hung (2012), Karim *et al.* (2002), Santoro *et al.* 2012), Gilmore *et al.* (2003), projects would be implemented more easily and successfully with the support of the people; otherwise, those projects would be negatively affected. If projects have negative effects on the interests of households, they will have many difficulties in progress and results. Therefore, investors will feel cautious about their investment decision. As a result, the less negative impacts projects have on households, the more likely they are invested and vice versa.

+) Estimated Traffic Volume (LL): This reflects the number of vehicles expected to circulate per day; the unit of calculation is PCU / day. The more important the project is, which meets the needs of society, the more probability of being approved the project has, and vice versa (Karim *et al.* (2002), Santoro *et al.* (2012), Gilmore *et al.* (2003)).

+) Natural conditions (DKTN): Natural conditions are an important factor affecting the investment decision. Investment projects for road traffic infrastructure development under outdoor conditions are relatively influenced by the natural conditions of the localities where the projects are implemented. Therefore, favorable natural conditions will positively affect investment decisions and vice versa (Agnieszka Chidlow & Stephen Young (2008), Tu Quang Phuong, Pham Van Hung (2012)).

3.2. Research scope

The study focused on the factors affecting the investment decision in road traffic infrastructure development funded by the state budget in Vietnam.

4. Research results

4.1. The scale of investment capital for road traffic infrastructure development funded by the state budget

Total investment capital for road traffic infrastructure development in the 2011-2015 period was about 380,000 billion VND, increasing by average 38% per year, including: State budget and related state budget with 144,000 billion VND (38%); Government bonds with 113,000billionVND (30%); The remaining funds mobilized outside the budget with about 121,000 (32%).

Funding from the state budget comes from two main sources, namely official development assistance (ODA) and state budget, of which ODA significantly contributes to the investment in road traffic infrastructure development in Vietnam in the period 2011-2015 with about 31% of total investment capital.

Funding from government bonds is also one of the important sources of investment in road traffic infrastructure development in Vietnam, contributing up to 30% of the total investment, increasing by more than 34% during the study period. In 2011, investment capital from government bonds accounted for 11,078 billion VND; this figure increased to 36,376 billion VND by 2015. This is one of the important sources of capital mobilized for investment in road traffic infrastructure development in Vietnam.

Table 1
Summary of investment capital for road traffic infrastructure construction in period 2011-2015

Unit: thousand billion VND

No	*Sources*	*2011*	*2012*	*2013*	*2014*	*2015*	*Total in 2011-2015 period*	*Proportion (%)*	*Growth (%)*
I	ODA+ State budget	13,545	23,666	29,98	34,13	42,88	144,201	38,0	33,4
1	*ODA*	*11,385*	*20,127*	*21,768*	*31,5*	*33,164*	*117,944*	*31,1*	*30,6*
2	*State budget*	*2,16*	*3,539*	*8,212*	*2,63*	*9,716*	*26,257*	*6,9*	*45,6*
II	Government bonds	11,078	16,038	14,768	35,545	36,376	113,806	30,0	34,6
III	Non-state budget (BOT, PPP)	8,787	8,005	21,761	41,3	41,98	121,833	32,1	47,8
	Total	**33,411**	**47,709**	**66,509**	**110,975**	**121,236**	**379,84**	**100**	**38,0**

Source: Department of Planning and Investment - Ministry of Transportation

4.2. Exploring a number of factors affecting the investment decision in road traffic infrastructure development funded by state budget in Vietnam

The study used the Binary Logistic regression to analyze the influence of certain factors on the investment decision in road traffic infrastructure development funded by state budget. The results are shown as follows:

Table 2
Omnibus Tests of Model Coefficients

		Chi-square	*df*	*Sig.*
Step 1	Step	212.247	5	.000
	Block	212.247	5	.000
	Model	212.247	5	.000

Source: Results from the data analysis with the help of SPSS 20.0 software

According to the test results of the model, the coefficient Sig <0.05, so the correlation between the dependent variable and the independent variables in the model is statistically significant with a confidence interval greater than 99%.

Table 3
Model Summary

Step	*-2 Log likelihood*	*Cox & Snell R Square*	*Nagelkerke R Square*
1	84.121[a]	.629	.839

(a) Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Source: Results from the data analysis with the help of SPSS 20.0 software

The explanatory power of the model, with the coefficient R2 Nagelkerke = 0.839, indicates that about 83.9% of the variance of dependent variable is explained by independent variables in the model, the rest being due to other factors.

Table 4
Classification Table[a]

Observed			*Predicted*		
			KQ_DA		*Percentage Correct*
			0	*1*	
Step 1	KQ_DA	0	94	9	91.3
		1	10	101	91.0
	Overall Percentage				91.1

a. The cut value is .500

Source: Results from the data analysis with the help of SPSS 20.0 software

Results of Table 4 on the accuracy of the predictions show that of 103 non-invested projects, the model accurately predicted 94 cases with 91.3% of accuracy. For 111 cases with investment decisions, the model accurately predicted 101 cases; the accuracy prediction rate is about 91.0%. From that, the accuracy prediction rate of the model is 91.1%.

Table 5
Variables in the Equation

		B	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
Step 1[a]	DKKTXH	.900	.302	8.865	1	.003	2.460
	DKTN	-.857	.522	2.693	1	.101	.425
	HD	.967	.321	9.056	1	.003	2.629
	QH	1.289	.393	10.780	1	.001	3.629
	LL	.958	.396	5.858	1	.016	2.607
	Constant	-14.805	2.484	35.535	1	.000	.000

(a) Variable(s) entered on step 1: NNDT, S_dat_anhhuong, Hodan_anhhuong, Danh_gia_GT, LN_LUU_LUONG.

Source: Results from the data analysis with the help of SPSS 20.0 software

+) The suitability of the project with the socioeconomic development planning (QH): Measuring the appropriateness of investment projects for road traffic infrastructure development funded by state budget with the socioeconomic development planning of the country. According to the results of written evaluations by relevant agencies, departments and institutes, when mentioning each project, the researcher used data coded according to the five-point Likert scale to identify the results, in which the result value was 1 if inconsistent, and incrementally increase to scale 5 if appropriate. The result of the study showed that the coefficient B = 1.289 indicating the positive relationship between the suitability of the socioeconomic development planning of the project and the investment decision. This research result also supports the views of Tu Quang Phuong and Pham Van Hung (2012)

+) Assessment of the project impact on households (HD): reflecting the level of investment project impact on households, in which, the five-point Likert scale

was used to encode data from the evaluation of relevant units. The data encoding is done as follows, the expected number of affected households were included in the pre-feasibility reports of projects (related to land loss of households, households affected by projects); if the number of affected households was less than 1000, it would be coded as 5; more than 1000 and less than 2000, the value was 4; more than 2000 and less than 3000, the value was 3; more than 3000 and less than 4000, the value was 2; and more than 5000, the value was 1. Calculated results of the researcher showed that the coefficient B = 0.967, indicating that if the less affected households were, the higher probability of investment decision the project had. In fact, the support of people for investment projects in road traffic infrastructure development is very important; if households support, the implementation of the project will be favorable. In addition, limiting the negative impacts on people will also increase the possible investment of the project. The research results support the views of Phung Xuan Nha (2012), Tu Quang Phuong, Pham Van Hung (2012), Karim *et al.* (2002), Santoro *et al.* (2012), Gilmore *et al.* (2003).

+ Natural conditions (DKTN): Natural conditions are an important factor affecting the investment decision. Investment projects for road traffic infrastructure development implemented under outdoor conditions and are relatively influenced by the natural conditions of the localities. However, to meet the requirements of the infrastructure for socioeconomic development of localities, despite difficult natural conditions, the Government still has to invest. This is a distinctive feature of the government investment project in comparison with private agencies when carrying out production and business activities. The results of the study have showed that the coefficient B = -0.857, which indicates that areas with harsh natural conditions seemed to a negative impact on investment projects.

+ Estimated traffic volume (LL): This reflects the expected number of vehicles to circulate per day, the unit isPCU per day, and the coefficient B = 0.958 indicates the positive relationship between variables and the probability of the investment decision. The results of the study support the views of Karim et al. (2002), Santoro et al. (2012), Gilmore et al. (2003)

5. Recommendations

Based on the research results, the researcher has proposed some suggestions to help state management units accurately select the projects, minimize the risk for investment in road traffic infrastructure development funded by state budget:

+ Determining the list of priority investment in line with the national socioeconomic development planning.

+ Paying more attention to the investment in road traffic infrastructure development funded by state budget for projects which have links with other regions, production support, improvement of investment environment, ensuring social security, national security and defense, implementation of target programs, etc.

+ Priority should be given to key projects which are urgent and capable of being completed soon; resolutely not deciding on investment with projects that are not qualified and do not have sufficient investment procedures; minimizing the advance of budget plan.

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