An Empirical study of dynamic on Chinese enterprises investing hydropower project in Southeast Asian countries

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Abstract. On the basis of analyzing the internal investment driving forces, external investment attraction and investment binding force of Chinese enterprises investing in hydropower projects in Southeast Asian countries, We use SEM to verify and revise the conceptual model of the relationship between dynamic factors and the behavior of Chinese enterprises investing in hydropower projects in Southeast Asian countries and the interaction of latent variables. Then we obtain the path and path coefficient of the interaction between the dynamic factor and the investment behavior, so as to verify the overall structural relationship of the Chinese enterprises' investment in the hydropower projects in the Southeast Asian countries.

1. Introduction
Overseas hydropower project investment is an important component of China's foreign investment [1]. Southeast Asian countries are rich in hydropower resources, but with a low degree of development and utilization, and lack of hydropower development necessary capital, technology, equipment. In order to solving the problem of hydropower resources shortage, countries have formulated the medium and long-term development planning in the field of infrastructure and power[2]. At present, the study of transnational investment motivation hydropower project is less, and lack of the research about influence mechanism between motivation factors and investment behavior[3-5]. In this paper, the Chinese companies to invest in Southeast Asian countries hydropower project on empirical research, aimed at seeking Chinese enterprise power of hydropower project investment of southeast Asian nations push factors and constraints, for the development of Chinese enterprise provides the reference for the relevant policies of hydropower project investment of southeast Asian nations.

2. Analysis of Chinese companies to invest in the hydropower project power factor of Southeast Asian nations
(1) The internal investment incentive factors
Relevant scholars have studied the motives of Chinese enterprises' transnational investment from the perspective of development strategy, efficiency promotion and so on[6-9]. From what has been discussed above, the internal investment incentive factors of Chinese enterprise include the need for expanding overseas markets, for optimizing their own investment structure, for avoiding domestic market competition and the development of the hydropower industry.

(2) The external investment attraction
Some scholars[10-12] have studied the external attraction of domestic enterprises' transnational investment from the resources endowment, policy environment and market environment of the host
country. The research shows that rich hydropower resources, good investment market, loose the institutional environment and strong market competitiveness is the important external investment attraction of southeast Asian nations.

(3) The investment binding factors

In view of the complex international investment environment and many uncertain risks of overseas investment, scholars have tried to find the restrictive factors, in order to provide theoretical support for risk control and crisis response [13, 14]. The research found that the resistance of overseas investment includes five aspects, such as technical standards, cultural differences, cooperation goal conflict, information asymmetry and financing capacity constraints.

3. Preliminary design of the Dynamic investment model

3.1 Theory hypothesis

The main motivation for transnational investment is to seek the host country's technology, markets, cheap raw materials and labour resources [15].

H1: Internal investment driving forces has a positive impact on the investment behavior.

H2: External investment attraction has a positive impact on the investment behavior.

H3: Investment binding force has a negative impact on the investment behavior.

H4: Investment binding force has a negative impact on internal investment driving forces.

H5: Investment binding force has a negative impact on external investment attraction.

According to the above analysis, the dynamic conceptual model of Chinese enterprises investing in hydropower projects in southeast Asian countries is constructed, as shown in figure 1.

![Fig. 1. The dynamic model](image)

3.2 Measurement index

From the above analysis, we get the measurement index of dynamic factors for Chinese enterprises to invest in Southeast Asia hydropower projects, as shown in Table 1.

| No  | Measurement factors                | Measurement index                                      |
|-----|------------------------------------|--------------------------------------------------------|
| 1.1 | internal investment               | Enterprises to develop overseas markets(NQ1)          |
| 1.2 | driving forces(NQ)                | Enterprises investment structure adjustment(NQ2)      |
1.3 Enterprises’ own development needs (NQ3)
1.4 Companies around the domestic competition (NQ4)
2.1 Rich in hydropower resources (WX1)
2.2 Good water and electricity investment market (WX2)
2.3 Loose policy environment of hydropower investment (WX3)
2.4 Higher competitiveness of investment (WX4)
3.1 Technical standards and specifications (YS1)
3.2 Cultural differences (YS2)
3.3 Cooperation goal conflict constraints (YS3)
3.4 Asymmetric information constraints (YS4)
3.5 Financing capacity constraints (YS5)
4.1 Enterprises under the influence of regional economic (TZ1)
4.2 The promotion of enterprise geopolitics (TZ2)
4.3 Promote enterprise by international organizations (TZ3)
4.4 Enterprises at home and abroad by the policy support (TZ4)
4.5 Companies seek resources and cheap Labor (TZ5)

4. Empirical analysis

The survey questionnaire is for nine Chinese companies investing in hydropower projects in Southeast Asian countries. 200 questionnaires were issued. 162 valid questionnaires were obtained which was accounted for 87.1% of the returned questionnaires.

4.1 Test of normality

We used box plots to analyze the normality test of sample data. The statistical data value is distributed between 2 and 5, which is in a normal distribution.

4.2 Test of reliability

We used the consistency index Cronbach’s alpha value to test the reliability of the sample data. The reliability of four implicit variables is 0.735. Each implicit variable was shown in Table 2.

| Implicit variables | Number of measurable variables | Cronbach’s Alpha |
|-------------------|--------------------------------|-----------------|
| Internal investment driving force | 4 | 0.869 |
| External investment attraction | 4 | 0.842 |
| Investment binding force | 5 | 0.925 |
| The investment behavior | 5 | 0.940 |
| Total | 18 | 0.735 |

We can get four Cronbach’s Alpha values such as internal investment driving force of 0.869, external investment attractive of 0.842, investment binding force of 0.925, the investment behavior of 0.940. All these values are greater than 0.7. Data has a higher credibility.

4.3 Test of validity

We used exploratory factor analysis to test the validity of the questionnaire, as shown in Table 3.

| Implicit variables | Measurement options | Factor load | KMO | Bartlett $\chi^2$ | P |
|-------------------|---------------------|-------------|-----|-------------------|---|
| NQ                | NQ1                 | 0.732       |     |                   |   |
|                   | NQ2                 | 0.700       |     |                   |   |
|                   | NQ3                 | 0.711       |     |                   |   |
|                   | NQ4                 | 0.740       |     |                   |   |
| WX                | WX1                 | 0.646       | 0.755 | 135.020           | 0.000 |

We used exploratory factor analysis to test the validity of the questionnaire, as shown in Table 3.
4.4 Model correction and path interpretation

(1) Identification and correction of measurement model

We calculate that the standard error of each factor is less than 0.2, the critical ratio is greater than 7, and the standardized coefficient is greater than 0.5 and less than 0.95. The goodness of fit index of the initial model is shown in Table 4.

Table 4. The goodness of fit index of the initial model

| Measurement model               | CMIN/DF | CFI  | GFI  | NFI  | RMSEA | Description                                      |
|--------------------------------|---------|------|------|------|-------|-------------------------------------------------|
| Internal investment driving force | 0.276   | 1.000| 0.997| 0.996| 0.000 | Fitting are all meet the requirements             |
| External investment attraction  | 5.218   | 0.936| 0.937| 0.925| 0.23  | CMIN/DF and RMSEA does not meet the requirements, the model need to be modified |
| Investment binding force        | 4.251   | 0.951| 0.910| 0.938| 0.202 |                                                 |
| The investment behavior         | 3.848   | 0.961| 0.915| 0.949| 0.189 |                                                 |

The estimated values of the modified parameters are shown in Table 5.

Table 5. Revised model parameter estimation and goodness of fit index

| Model path | Standardized Coefficients | S.E. | C.R. | P | CMIN/DF | CFI  | GFI  | NFI  | RMSEA |
|------------|---------------------------|------|------|---|---------|------|------|------|-------|
| NQ1<---NQ  | 0.803                     | —    | —    | — |         |      |      |      |       |
| NQ2<---NQ  | 0.769                     | 0.121| 7.097| ***| 0.276   | 1.000| 0.997| 0.996| 0.000 |
| NQ3<---NQ  | 0.783                     | 0.126| 7.289| ***|         |      |      |      |       |
| NQ4<---NQ  | 0.813                     | 0.114| 7.416| ***|         |      |      |      |       |
| WX1<---WX  | 0.613                     | —    | —    | — |         |      |      |      |       |
| WX2<---WX  | 0.602                     | 0.16 | 5.653| ***| 0.295   | 1.000| 0.998| 0.998| 0.000 |
| WX3<---WX  | 0.892                     | 0.28 | 5.371| ***|         |      |      |      |       |
| WX4<---WX  | 0.822                     | 0.25 | 5.529| ***|         |      |      |      |       |
| YS1<---YS  | 0.905                     | —    | —    | — |         |      |      |      |       |
| YS2<---YS  | 0.956                     | 0.069| 14.379| ***|         |      |      |      |       |
| YS3<---YS  | 0.845                     | 0.084| 10.885| ***| 1.732   | 0.996| 0.984| 0.990| 0.096 |
| YS4<---YS  | 0.806                     | 0.091| 9.415| ***|         |      |      |      |       |
| YS5<---YS  | 0.743                     | 0.092| 8.591| ***|         |      |      |      |       |
(2) Fitting and correction of structural model

The critical ratio between investment binding force and the investment behavior is 1.42 and P is 0.432. It is shown that the path does not reach statistical significance, that is, hypothesis 3 is not valid. Therefore, it is necessary to modify the initial conceptual model. The revised model is shown in Figure 2.

The path coefficients of the modified model latent variables are as shown in Table 6. All the goodness of fit indexes meet the requirements.

![Correction model](image)

**Fig. 2. Correction model**

**Table 6. Correction model path coefficient**

| Model path | Standardized Coefficients | S.E.  | C.R.  | P   |
|------------|----------------------------|-------|-------|-----|
| NQ<---YS   | -.829                      | .124  | -7.520| *** |
| WX<---YS   | -.810                      | .100  | -6.836| *** |
| TZ<---NQ   | .626                       | .145  | 3.625 | *** |
| TZ<---WX   | .334                       | .187  | 1.998 | 0.046|

Goodness of fit index: CMIN/DF=1.283, CFI=.922, GFI=.905, NFI=.933, RMSEA=.065
The effect of various dynamic factors on the behavior of Chinese enterprises investing in hydropower projects in south-East Asian countries is shown in table 7.

| Table 7. Investment effect |
|---------------------------|
| Internal investment      |
| driving force            |
| DE | IDE | TE |
| Internal investment      |
| driving force            |
| DE | IDE | TE |
| External investment      |
| attraction              |
| DE | IDE | TE |
| The investment behavior  |

| Internal investment driving force | External investment attraction | Investment binding force |
|----------------------------------|---------------------------------|--------------------------|
| DE     | IDE  | TE  | DE     | IDE  | TE  | DE     | IDE  | TE  |
| –      | –     | –    | –      | –     | –    | -0.83  | –     | -0.83 |
| –      | –     | –    | –      | –     | –    | -0.81  | –     | -0.81 |
| 0.63   | –     | 0.63 | 0.33   | –     | 0.33 | –      | -0.79 | -0.79 |

Note: The direct effect is abbreviated as DE, the indirect effect is abbreviated as IDE, and the total effect is abbreviated as TE.

5. Conclusion
(1) The total effect between internal investment driving force and the investment behavior is 1.42. The hydropower projects invested by a company depend on the internal investment driving force rather than the external investment attraction. Therefore, the internal investment driving force is the main factor for Chinese enterprises to invest in hydropower projects in southeast Asian countries.

(2) The total effect between external investment attraction and the investment behavior is 0.33. This is the least of all the dynamic factors. It shows that the external investment attraction is less impetus for Chinese enterprises to invest in hydropower projects in Southeast Asia.

(3) The total effect between investment binding force and the investment behavior is -0.79. This shows that investment binding force has a great hindrance to Chinese enterprises investing in hydropower projects in Southeast Asian countries. At present, many problems have been encountered in the development of hydropower market in Southeast Asia, such as technical standard, Cultural differences.

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