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Is the Existing Hydropower Development Policy, 2001 Investment Friendly?

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Abstract

Nepal is endowed with an abundance of hydro resources. Its gross hydropower potential is estimated to be 83,290 MW technically. Out of which, 42,133 MW is ascertained as economically exploitable. However, in the span of 112 years, only around 2,900 MW is harnessed. It is obvious that the development of hydropower is a public policy-related matter. Previous studies exhibit several complications in hydropower development policy, 2001 such as private sector participation in electricity trade, lack of one window system, term of project, hedging mechanisms, foreign direct investment, and so forth. In this regard, this study aims to investigate its efficiency and effectiveness through quantitative research design. Herein, for the sake of empirical research three independent variables namely, Financial Incentives Sufficiency (FIS), Return on Investment Sufficiency (RoIS), and Market Access Sufficiency (MAS), and one dependent variable namely, Investment Friendliness (IF) was dealt. To collect the opinion of respondents a set of questionnaires comprising 11 questions was developed and approached to 108 informants from 25 diverse sectors of the hydro-industry. Herein, deductive reasoning was persuaded. For analyzing data, statistical tools such as arithmetic mean, standard deviation, factor analysis, Chi-Square tests, Mann Whitney "U" test, and Kruskal-Wallis "H" test were computed. Based on empirical analysis this study concludes that the hydropower development policy, of 2001 is investment-friendly. However, the study manifested a number of rooms that were to be addressed as changing the expectations of investors. On this ground, the findings of this study will be applicable with a view to formulating a more investment-friendly hydropower policy in the future.

Keywords: Hydropower Development Policy (HDP) 2001, Power Purchase Agreement (PPA), term of project, investment friendly, policy environment, and policy advocacy.

Introduction

Being affluent in water resources Nepal has failed to generate hydropower as expected though it can deliver multi-pronged benefits such as replacement of petroleum products, industrial development, employment generation, and so on. Asian Development Bank (2020) claims that even a 5 percent increase in hydropower generation would increase the cumulative GDP growth by 13 to 25 percent. However, in reality, Nepal is unable to exploit this enormous resource fully for its economic development (ADB, 2020). If we observe the past plans and programs in the hydropower sector, it deems to be superficial. This is because, the ten yearly hydropower development plan (MoE, 2009), aimed to generate 10,000 MW within ten years, twenty yearly hydroelectricity development plan (MoE, 2010), aimed to generate 25,000 MW within twenty years, likewise in 2019 the Government of Nepal (GoN) has announced to generate 15,000 MW by 2029, furthermore in 2023 the government has declared to generate 27,500 by 2035. It is noted that on 4th January 2024, India and Nepal signed a long-term agreement for exporting 10,000 MW of hydroelectricity to India over the next 10 years. Nevertheless, the achievement of those objectives seems to be unachievable.

Moreover, the Water Energy Commission Secretariat (WECS, 2013) stated that there was a lack of appropriate policies to encourage domestic resources for the development of hydropower. Dhungana (2019) viewed IEE/EIA, resettlement, and rehabilitation as an unsolved issue of the hydropower industry. It is stated that mega projects such as 1200 MW Budhigandaki, 750 MW West-Seti, and 900 MW Upper Karnali have been suffering from such issues. Besides, Nepalese electricity is going to be surplus, however, there is no market assurance. In 2021/22 NEA wasted 500 MW of hydroelectricity and incurred a loss of Rs.5 billion. Nepal could not export such surplus electricity to India owing to limited permission. Besides, India has just permitted 632 MW to export in

2023/24 (NEA). Herein, Panth (2017) in her study suggested relaxing laws, rules, and regulations to accelerate this sector. According to Thapa (2016), there were lots of flaws and gaps in the policy due to which private sector and international investors were in the position of wait and see. In this regard, MoE (2009) indicated that there was a lack of policy provision according to the changing scenario. Furthermore, there was also an absence of an effective policy for encouraging the use of domestic resources for the development of hydropower (WECS, 2013).

On the other hand, the researcher's literature review exhibits that, hydropower promoters have been facing a number of problems in terms of survey, construction, distribution, cash subsidy, tree felling, land acquisition, rehabilitation, unwanted demands of local people, transmission networks, industrial security, market assurance, power purchase agreement, electricity trade freedom, term of project, physical security, tax and fee burden, rate of royalty, implementation of budgetary promises, and so forth.

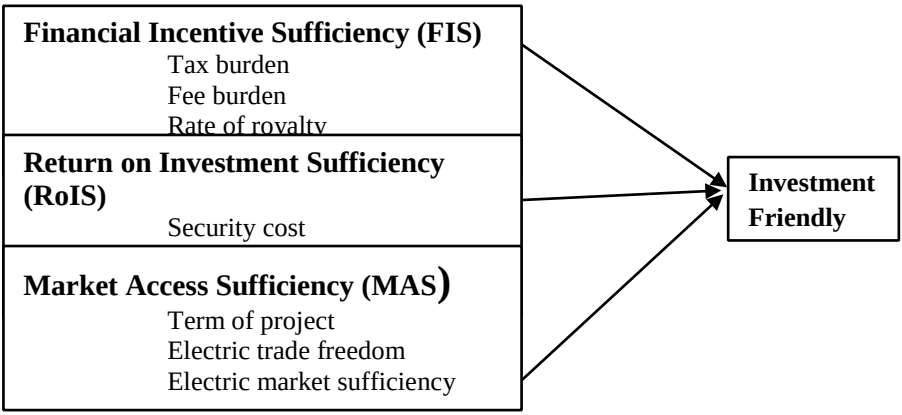
The promotion and development of hydropower is itself a policy concern. It is obvious that neither a policy completes itself nor fulfills the requirement of forever. The prevailing hydropower development policy, 2001 was promulgated two decades previously. During the last two decades, political, legal, and economic scenarios have changed significantly. The above-mentioned issues indicate that there is a policy problem in the hydropower sector. Consequently, it needs to conduct empirical research to find out the deficiencies accordingly. Without in-depth study, the root causes can't be explored. If those policy obstacles might not be found or could not be addressed investors would not be ready to invest as expected. On this ground, this study is dedicated to find out the investment friendliness of HDP, 2001. Moreover, it aims to dig out the policy constraints and obstacles faced by the hydropower developers. Furthermore, it desires to identify new facts to form an investment-friendly hydropower development policy in the future.

Conceptual Framework

This study deals with quantitative data where independent and dependent variables are clearly defined. Financial Incentives Sufficiency (FIS), Return on Investment Sufficiency (RoIS), and Market Access Sufficiency (MAS) are regarded as independent variables and Investment Friendly (IF) as dependent variables. Financial Incentives Sufficiency (FIS) comprises tax burden, fee burden, rate of royalty, rehabilitation and resettles cost. Return on Investment Sufficiency (RoIS) consists of a power purchase agreement, provision of force majeure, and security cost. Likewise, Market Access Sufficiency (MAS) includes electric market sufficiency, trade freedom, and the term of the project.

Figure 1: Independent and dependent variables

Independent variables
Dependent variable



This study believes that dependable variables directly affect independent variables. Furthermore, independent variables are components that hinder the investors. On this ground, it is hypothesized that the existing hydropower development policy, 2001 is not investment-friendly.

Materials and methods

This study has followed a quantitative research design. It basically dealt with primary data and information. Such data and information were collected through an online survey questionnaire employing the Kobo Tool Box data collection platform. Due to the nature of the study, it is difficult to determine the total population. Therefore, 108 informants from 25 diverse fields of hydropower were approached as a unit of analysis. To select proper informants, a judgmental sampling technique was adopted. The questionnaire contained 11 questions and the informants were from the capital city Kathmandu. Data and information were collected during October- December 2022. This study carefully examined validity and reliability in each step of the research process (during the selection of research methodology, confirming the research design, determining the population and sample size, developing questionnaires, selecting measuring tools, and applying theory). Six experts were approached to validate the contents of the questionnaires. Necessary amendments were made in accordance with the suggestions of experts. To determine the reliability of data, the internal consistency was examined using Cronbach alpha (0.828) which was greater than the commonly accepted standard 0.7. To measure investment friendliness, 10 constructs were composted into 3 variables applying factor analysis. On the other hand, a five-point Likert scale was pursued to measure the perception of informants. For the sake of analyzing quantitative data, standard statistical tools such as mean, standard deviation, factor analysis, Chi-Square (X^2) tests, Mann Whitney "U" test, and Kruskal-Wallis "H" test were applied. To compute data Statistical Package for the Social Sciences (SPSS) was used.

Results and discussion

The term "Investment friendly" is broad itself. It encompasses parameters like investment security, provision of tax holidays, elimination of dual tax, stability and full execution of public policy, elimination of malpractice, assurance of good governance, visa facility, repatriation of earnings, and so forth.

For this research point of view, the terms of the project, electricity trade freedom, electric market sufficiency, security cost, rehabilitate and resettle provision, rate of royalty, power purchase agreement, tax burden and fee burden were regarded as the parameters of investment friendly.

Perception on major parameters of hydropower development policy, 2001

This study exhibits the perception of informants in terms of arithmetic mean and standard deviation. In order to understand the simple average score of all respondents, an arithmetic mean was computed. Likewise, to understand dispersion scores offered by informants, the standard deviation was calculated. Since, hydropower development policy, 2001 is a social issue, it is difficult to measure informants' aptitude, opinion, perception and behavior in numerical value or specific units. Consequently, a five-point Likert scale was embraced to rate the perception of informants: Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), and Strongly Agree (SA). Herein, arithmetic mean and standard deviation have been computed with the help of the SPSS package. Moreover, shortcomings, suggestions, and recommendations made by informants have been presented simultaneously.

Table 1. Perception on major parameters of hydropower development policy, 2001

Description	**SD***	**D****	**N*****	**A******	**SA*******	**Mean**	**SD**
Opinion on electric market sufficiency	7 (6.73)	37 (35.57)	13 (12.5)	36 (34.61)	11 (10.57)	58.38	20.82
Opinion on PPA	7 (6.93)	52 (51.48)	18 (17.82)	22 (21.78)	2 (1.98)	63.49	18.032
Opinion on electric trade freedom	3 (2.88)	42 (40.38)	15 (14.42)	13 (12.5)	31 (29.80)	63.80	26.27
Opinion on term of project	5 (5)	44 (44)	21 (21)	19 (19)	11 (11)	65.20	24.14
Opinion on rehabilitate and resettle provision	2 (2)	47 (47)	28 (28)	20 (20)	3 (3)	59.76	17.48

Opinion on force majeure	0 (0)	63 (61.16)	16 (15.53)	14 (13.59)	10 (9.70)	65. 92	20. 10
Opinion on security concern	6 (5.769)	45 (43.26)	26 (25.00)	24 (23.07)	3 (2.88)	57. 08	21. 46
Opinion on tax burden	6 (5.76)	57 (54.80)	13 (12.50)	19 (18.26)	9 (8.65)	61. 68	23. 06
Opinion on fee burden	1 (0.96)	53 (50.96)	23 (22.12)	16 (15.38)	11 (10.57)	63. 93	20. 58
Opinion on rate of royalty	1 (0.97)	65 (63.10)	16 (15.53)	13 (12.62)	8 (7.76)	65. 12	18. 69

SD*Strongly Disagree, D** Disagree, N***Neutral, A**** Agree, SA***** Strongly Agree

A. Opinion on electric market sufficiency

With regard to electric market sufficiency, out of 104 informants 37 agreed, 36 disagreed, 13 remained neutral, 11 strongly agreed, and 7 strongly disagreed. In terms of percentage, it remained as 35.57, 34.61, 12.50, 10.57, and 6.73 respectively. Moreover, on analyzing 97 informants, the mean score of market sufficiency resided at 58.38 and the standard deviation score stood at 20.82. From the data, it can be concluded that the electric market is sufficient.

B. Opinion on power purchase agreement

On power purchase agreement out of 101 informants, 52 agreed, 22 disagreed, 18 remained neutral, 7 strongly disagreed, and 2 strongly agreed. In terms of percentage, it constitutes 51.48, 21.78, 17.82, 6.93, and 1.98 respectively. Furthermore, on an investigation of 98 informants, the mean score of power purchase agreement remained at 63.49. On the other hand, the standard deviation score was revealed at 18.04. It means the power purchase agreement is allowable.

C. Opinion on electric trade freedom

In electricity trade freedom out of 104 informants, 42 agreed, 31 strongly agreed, 15 remained neutral, 13 disagreed, and 3 strongly disagreed. In respect of percentage, it was 40.38, 29.80, 14.42, 12.5, and 2.88 respectively. Additionally, out of 94 informants, the mean score of electricity trade freedom

stood at 63.80 and on the other hand, the standard deviation score was located at 26.27. Hence, based on empirical data it can be concluded that trade freedom in the hydropower industry is essential.

D. Opinion on term of the project

When questioning the opinion on term of the project, 44 agreed, 21 remained neutral, 19 disagreed, 11 strongly agreed, and 5 strongly disagreed of the total 100 informants. In terms of percentage, it was inhabited as 44, 21, 19, 11, and 5 respectively. Likewise, on the inspection of 96 informants, the mean score on term of project was located at 65.20. On the other hand, the standard deviation was exposed at 24.14. Therefore, it can be claimed that the term of the project is reliable. Moreover, the government of Nepal has to do homework to extend project tenure up to 50 years as the private sector had suggested.

E. Opinion on rehabilitate and resettle provision

Noting the opinion of 100 informants on rehabilitate and resettle cost, 47 agreed, 28 remained neutral, 20 disagreed, 3 strongly agreed, and 2 strongly disagreed. In terms of percentage, it remained as 47, 28, 20, 3, and 2 respectively. In addition, on the observation of 96 informants, the mean score of rehabilitate and resettle concern appeared at 59.76. Furthermore, the standard deviation score was found at 17.48. Hence, it can be ascertained that the rehabilitate and resettle provision is acceptable. However, the unwanted demands of local people and the upper ceiling of property valuation should be resolved accordingly.

F. Opinion on force majeure

On the agenda of force majeure and extension of the license period, out of 103 informants, 63 agreed, 16 remained neutral, 14 disagreed, 10 strongly agreed and no one strongly disagreed. In respect of percentage, it was represented as 61.16, 15.53, 13.59, 9.70, and zero respectively. Further analyzing 96 informants, the mean score of force majeure and extension of license period was seen at 65.92. Likewise, the standard deviation scores of such phenomena appeared at 20.10. Hereby, such a fact affirms that the provision on force majeure is justifiable. Notwithstanding, it needs to rethink conditionality. In

other words, an extension of the license period should be based on the nature of force majeure rather than flat.

G. Opinion on security concern

Out of 104 informants, when discussing security concerns, 45 agreed, 26 remained neutral, 24 disagreed, 6 strongly disagreed, and 3 strongly agreed. In the form of percentages, it dwelled as 43.26, 25.00, 23.07, 5.769, and 2.88 respectively. Furthermore, on the examination of 96 informants, the mean score of security cost was located at 57.08. Its standard deviation score was viewed at 21.46. Therefore, based on the informant's argument along with empirical data it can be ascertained that the security concern is less congenial since the government of Nepal is collecting tax and royalty from hydro-developers. On the other hand, the project is handed over to the government after the expiry of term of the project. So, it is the responsibility of the government to provide the best security with a nominal charge.

H. Opinion on the tax burden

Bringing into question the "tax burden" out of 104 informants; 57 agreed, 19 disagreed, 13 remained neutral, 9 strongly agreed, and 6 strongly disagreed. In terms of percentage, it resided as 54.80, 18.26, 12.50, 8.65, and 5.76 respectively.

Moreover, on the observation of 97 informants, the mean score of tax burden appeared at 61.68. Hence, the standard deviation score was visible at 23.06. Herein, this study affirms that the tax burden is bearable. Notwithstanding, the Government of Nepal should rethink to refund the tax paid in terms of VAT. It is also necessary to rethink extending tax holidays up to 15 years.

I. Opinion on Fee Burden

In questioning the fee burden, out of 104 informants, 53 agreed, 23 remained neutral, 16 disagreed, 11 strongly agreed, and 1 strongly disagreed. In respect of percentage, it remained as 50.96, 22.12, 15.38, 10.57, and 0.96 respectively. Further examination of 96 informants, the mean score of fee burden resided at 63.93 and the standard deviation score was revealed at 20.58. Hence it can be insisted that the fee burden is allowable. Nevertheless, it might be better to levy a higher fee after imparting the generation license. In

addition, access road, environmental situation, and distance from the load center need to be taken into consideration while determining the fee.

J. Opinion on rate of royalty

When asked about the rate of royalty, 65 agreed, 16 remained neutral, 13 disagreed, 8 strongly agreed, and 1 strongly disagreed out of 103 informants. In terms of percentage, it was located at 63.10, 15.53, 12.62, 7.76, and 0.97 respectively. Moreover, on the consideration of 97 informants, the mean score of rates of royalty was found to be 65.12. Its standard deviation score stood at 18.69. Hereby, it can be ascertained that the rate of royalty is tolerable. Nonetheless, the government of Nepal must exercise to make it more reliable, justifiable, and scientific.

K. Opinion on hydropower development policy, 2001 investment friendly and its implementability

Table 2. Investment friendly and its implement ability status of existing HDP, 2001

Description	N	Range	Min	Max	Mean	Sd. Dev	Mode
HDP,2001, friendliness	100	85	5	90	60.64	20.42	70
HDP,2001 implementation	90	80	15	95	58.34	16.40	60

On the topic of "whether the hydropower development policy, 2001 is investment friendly" out of 108 respondents, 100 respondents offered their perception. Out of them, the minimum score was 5 and the maximum score was 90. Its range was 85. The most repeated score i.e., mode appeared at 70. Similarly, the average score or mean resided at 60.64 and standard deviation score appeared at 20.42. Based on these facts, it can be ascertained that the hydropower development policy, 2001 is investment-friendly. Taking the opinion of hydropower development policy, 2001 implement ability of 108 respondents, 90 respondents offered their score. Out of them, the minimum and maximum scores appeared 15 and 95 respectively. Its range appeared to be 80. Moreover, its mean score and standard deviation score resided at 58.34

and 16.40 respectively. As the mean is greater than 50 and the standard deviation is 6 times less than cent-percent, it can be claimed that the implementability of the hydropower development policy, 2001 is credible.

4.2 Association between Financial Incentive Sufficiency (FIS), Return-on-Investment Sufficiency (RoIS), and Market Access Sufficiency (MAS) with category of informants

Since the data did not follow normality, non-parametric tests such as Chi-Square, Mann-Whitney “U” and Kruskal- Wallis "H" have been computed in order to exhibit relationships within variables. All the respondents were classified into government and private sectors. Concerning the "sufficiency of financial incentives" variable, among 57 government-related informants, only 4 expressed disagreements while 53 supported the sufficiency. In contrast, among 43 private sector informants, 20 disagreed, and 23 agreed. The Pearson Chi-Square value for the association between financial incentives sufficiency (FIS) and informant category is 22.04. Notably, the "p" value, appearing as 0.00 is significantly lower than the widely accepted threshold of 0.05. Consequently, the null hypothesis is rejected, indicating a significant association between financial incentive sufficiency (FIS) and the category of informants. Based on the ranking of FIS the average rank for 50 government sector informants is 54.65, while for private sector-related informants, it is 36.80. The Mann-Whitney "U" value is reported as 642.5, with a corresponding "p" value of .001 also indicating a notable difference in the mean score of financial incentives sufficiency (FIS) between government officials and private officials.

In terms of the "return on investment sufficiency (RoIS)" variable, among the 53 government sector informants, 22.64% disagreed, while 77.36% agreed. Conversely, among the 42 private sector informants, 38.10% disagreed, and 61.90% agreed. The Pearson Chi-Square value for the association between return-on-investment sufficiency (RoIS) and informant category is 2.720 with "p" value of 0.25 which is greater than the commonly accepted value of 0.05. Therefore, the null hypothesis is accepted, indicating no observed association between return-on-investment sufficiency (RoIS) and the category of informants. The average rank for 53 government sector-related informants is

51.02, while for 42 private sector-related informants, it is 44.19. The Mann-Whitney "U" value is reported as 953, with a corresponding "p" value of 0.222. The "p" value is higher than the commonly accepted alpha value of 0.05, indicating insignificance. Therefore, there is no significant difference in the mean score of return-on-investment sufficiency between government sector-related informants and private sector-related informants.

On the variable "market access sufficiency (MAS)," out of 57 government-related informants, only 3.51% (2) disagreed, while 96.49% (55) agreed. Conversely, among 43 private sector informants, 6.98% (3) disagreed, and 93.02% (40) agreed. The Pearson Chi-Square value for the association between market access sufficiency (MAS) and the informant category is 1.087. The corresponding "p" value of 0.581 is greater than the commonly accepted value of 0.05. This indicates that there is no observed association between market access sufficiency (MAS) and the category of informants. On the contrary, the average rank for government sector informants is 41.56, while for private sector-related informants, it is 53.61. The Mann-Whitney "U" value is reported as 793.5, with a corresponding "p" value of .031 indicating a significant difference in the mean score of Market Access Sufficiency (MAS) between government sector informants and private sector-related informants. This suggests that, while there may not be a clear association in terms of agreement or disagreement, there is a statistically significant difference in the mean scores of market access sufficiency between the two informant categories.

4.3 Relationship between Financial Incentive Sufficiency (FIS), Return on Investment Sufficiency (RoIS) and Market Access Sufficiency (MAS) with work experience in hydro-sector

work experience in hydropower was categorized into four categories, i.e., 0-10 years, 10-20 years, 20-30 years, and 30-40 years. The respective percentages for each category were found to be 29.41, 32.95, 30.59, 7.06 respectively. Regarding the FAS, the average rank for informants aged 0-10 years is 44.85, for informants aged 10-20 years is 35.20, for informants aged 20-30 years is 40.85, and for informants aged 30-40 years is 48.50.

The Kruskal-Wallis H value is reported as 2.919, with a corresponding p-value of 0.404. This implies that there is no significant difference in the mean scores related to financial incentives sufficiency (FIS) based on the participants' work experience in the hydropower sector.

In the same way, the RoIS mean rank of informants aged 0-10 years is 41.46, mean rank of informants aged 10-20 years is 40.20, the mean rank of informants aged 20-30 is 42.28, and the mean rank of 5 informants aged 30-40 is 45.10. Kruskal-Wallis “H” value appears 232 along with a P value of 0.972 indicating no significant difference in mean score of return-on-investment sufficiency on the basis of work experiments in hydropower sector.

In the case of MAS the mean rank of informants aged 0-10 years is 32.04, mean rank of informants aged 10-20 years is 40.88, mean rank of informants aged 20-30 is 47.72, and the mean rank of informants aged 30-40 is 49.30. The Kruskal-Wallis “H” value is found as 6.129 with P value of 0.105. Since "P" value is larger than the commonly accepted alpha value i.e. 05 indicating no significant difference in mean of market access sufficiency on the basis of work experiments in hydropower sector.

Conclusion

The findings of the study indicate that the electric market in Nepal is perceived as sufficient by a notable percentage of respondents. Power purchase agreements are generally considered acceptable, and there is a recognized need for trade freedom in the hydropower industry. The study also suggests that extending project tenure and addressing rehabilitation and resettlement provisions could enhance the overall viability of hydropower projects. While force majeure provisions are deemed justifiable, security provisions are seen as less favorable, necessitating the government's responsibility to provide adequate security. The study proposes reconsidering tax policies and royalty rates for a more sustainable and scientific approach. Additionally, it highlights the significance of financial incentives, return on investment, and market access sufficiency in influencing perceptions, with notable associations found based on the

category of informants. Overall, the study concludes that the hydropower development policy of 2001 is generally investment-friendly, but certain aspects require careful consideration and potential adjustments for optimal development.

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