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Determining the Underlying Reasons of License Termination and Cancellation Associated with Local Power Production in Turkey

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ABSTRACT

Considerable changes have taken place in power production investments in Turkey within the last decade. As a result, an increasing number of investments in this sector have been terminated or cancelled and still continue to do so. When these investments are analyzed, significant issues attributed to misconceptions on cash flow estimations, local community objections, changes in the environmental impact assessment regulation interpretations, diminished trust in the conducted project evaluations and the associated reduction of capital and funds have been observed. Thus, the main contributors and their underlying reasons for these issues are examined in this study. In order to determine the associated key aspects and parameters, a survey has been developed and distributed to companies working on the renewable energy sector with questions regarding the number and the size of the licenses they have, the percentage of them turning into investments, the major methods of financial evaluation they use in the decision making process, their ability to calculate the cash flows during project evaluation process and the modelling of associated risk factors in the renewable energy sector.

Keywords: Project Evaluation Methods, Power Production, License Termination, Turkey
JEL Classifications: O220, O250, Q280

1. INTRODUCTION

Introduction energy is a dynamic sector in Turkey and investments in this sector play have the utmost importance since they are;

- Utilizing the available opportunities
- Creating long-term cash flows
- Earning low risk stable income
- Acquiring wealth without using owner's equity through a good project with foreign resources
- Further utilizing financial leverage by collateralizing when the project begins.

Over a decade ago, the energy market regulation Law No. 5218 (established in 2002) paved the way for the private companies to generate trade and distribute power. With this law, Energy Market Regulatory Authority (EPDK) was established and hydroelectric, wind, coal, natural gas and geothermal power production license applications started. When the number of license applications started to increase considerably, EPDK has announced that the hydroelectric, wind and geothermal power plant applications started to increase considerably.

It was observed that some of the firms that got licenses had financial difficulties in the construction stages and could not complete their investments, and the ones that did complete had cash flow problems. It was discovered that these firms were not able to successfully conduct power production investment feasibility studies. The factors that reduce the accuracy of the feasibility studies are having higher costs than ones predicted/calculated in the investment capital spending, not having the expected energy production levels (especially in hydroelectric and wind power investments), the issues associated with inaccurate planning of cash flows as well as calculating risks and using insufficient financial evaluation methods during decision making stage. Thus, the main target of this survey study is to understand the underlying process behind the termination and cancellation of the investments in this sector in Turkey. In order to gain a deeper understanding of the underlying reasons, the present financial evaluation methods of these companies entering the market, the evaluation of risk factors as well as whether they calculate the cash flow balance when using financial leverage is studied. Before progressing any further, it should be noted that the term "termination" will be used for licenses that are expired, ended by the demand or the bankruptcy of the license owner or when the underlying conditions of licenses are no longer applicable. On the other hand, the term "cancellation" will be used for cases when the construction of the plant is not completed (or determined that it will not be able to be completed) within the pre-established time frame.

Renewable energy is a capital intensive investment among the electricity generation projects. Even though the initial investment is relatively high, the constant and variable production costs are low, and with the incentive systems these investments can create low risk, long-term cash flows. Projects in the energy sector are usually determined by five parameters that can differ widely with respect to regional and even site-specific factors.

Among these energy prices play one of the most important role since the profitability of a project depends on the cost gap between the conventional and the alternative energy that is being proposed to used instead. Technological effectiveness is also an essential parameter since renewable energy sources yield widely varying amounts of energy at different regions and often depend on site-specific parameters. Thus, one of the most popular renewable energy strategies is to have a portfolio of various technologies. Moreover, since this technology is growing rapidly, it becomes crucial to conduct feasibility studies continuously as what seemed infeasible couple of years ago might look quite different today. For example, the international renewable energy agency has estimated that global energy from renewables will double between 2014 and 2030 (especially solar energy), which will lower energy costs significantly. Thus, even though many companies in solar panel market was almost getting bankrupt a few years ago, they are now making significant profits as the industry is picking up (Gustke, 2014).

In addition, incentive mechanism also become imperative as there are usually available incentives in renewable energy technologies from feed-in tariffs to tax credits. Furthermore, capital expenditures are also vital since it varies significantly based on the project. In the cases of solar and wind, the material cost component becomes the key driver of project profitability. Finally, operations and maintenance can also comprise a significant portion of the cost depending on the selected technology and approach (Khemani, 2013).

When careful attention is paid to the aforementioned parameters, the economics of these investments can be attractive. For relatively good (but not exceptional) renewable projects, the internal rates of return (IRR) can meet hurdle rates for both developers and investors. Many analyses show developers and investors can achieve returns of 6-19% and 10-49% respectively in wind projects. IRRs for investors reach the higher end of their ranges in the when they get of upfront receipt of tax benefits. The financing structures also usually present a trade-off between IRR and net present value (NPV). A structure which yields high returns (due to upfront receipt of benefits) may have a lower NPV than a structure which yields moderate returns and whose benefits are spread over a longer period (Zindler and Haranis, 2011).

2. METHODOLOGY

In this study, 47 companies that has invested or currently investing in the Turkish energy sector is contacted and asked to participate in the developed survey. A majority of these companies had to turn down the survey for reasons of not being able to discuss private company information and therefore 12 of them have filled out the survey. The experiences of the author through over a decade of managerial position in this sector have been used to develop, conduct and evaluate the survey and interpolate the results in areas where only limited responses are retrieved from the surveys. It is clear that only a small portion of the companies that have invested in the energy sector could be accessed in this study. On the other hand, the company owners and senior management of the firms in the energy sector have also provided responses in various conferences, seminars and meetings that are highly compatible with the results that are achieved by the survey.

The companies were asked on the number and the magnitude of licenses and plants on the electricity power production in the areas of hydroelectric, wind, geothermal, coal and solar energy and their responses are collected to form Table 1. From the Table 1, it can be seen that the portfolio of the participants have hydroelectric power plant projects and investments the most and no natural gas powered energy investments. The largest power is determined to be coal powered power plant and when the average power is considered; hydroelectric power plant investments are 13.6 MW which is classified as small category.

Investment decisions are long-term decisions where investment alternatives are weighted against each other with the expectation that the investment will be profitable, and in order to do it, investors need evaluation methods to predict the profitability of their potential investments. The energy sector is changing in accelerating rates and tomorrow's business decisions depend on investment decisions made today with limited information. When a choice is needed to be made between alternatives, the need to consider future and incremental costs and revenue and the time value of money is wanted to be taken into account. Moreover, the procedures/aspects of the investment decisions used to help management make investment decision can be inadequate and misleading, which makes it hard for decision makers to make the right choices on whether to commit time and money on the evaluated projects (Hall, 2000; Beck et al., 2013; Archer and Ghasemzadeh, 1999).

Thus, among this procedure, a number of commonly used methods are used to evaluate the investment opportunities. These methods can determine whether to invest in an individual project or to

Table 1: The data collected with respect to the number of licenses and the min, max, average and total power of the various power plants

	Hydroelectric	Wind	Geothermal	Coal
Number of licenses	24	4	1	1
Min. power (MW)	4	20	3	N/A*
Max. power (MW)	45	50	3	N/A*
Average power (MW)	13.6	33	3	290
Total power (MW)	326	132	3	290

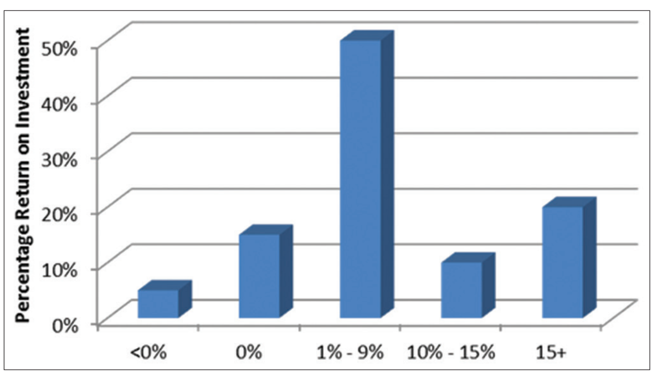
Source: EPDK Annual Report, 2014. Min. power: The minimum power electricity production license owned by the firms filled the survey, Max. power: The maximum power electricity production license owned by the firms filled the survey, average power: The average power electricity production license owned by the firms filled the survey, *No data was able to be connected on these areas with N/A choose to best one among various mutually exclusive projects (Remer and Nieto, 1995). Among the plethora of different evaluation methods, the most common ones when considering new projects or investments financial analysis, namely the NPV, the IRR, the payback period (PBP) and the return on investment (ROI), are asked in the survey.

In order to pick the right aforementioned evaluation technique for a given project, various questions are often asked by the associated decision makers in the company as shown in Table 2. It should be noted that even though there are various non-financial and strategic motivations behind the decisions made by these energy companies, the survey specifically cared for the quantitative methods only.

It can be said that most companies (such as utility, retailers and manufacturers) in the past avoided renewable energy sector (such as solar, wind and biomass) due to being too expensive in both short and long-term, especially compared to traditional form of energy. However, over the past decade, with the increasing cost and instability of conventional energy along with the increase in incentives and the reduction of cost for alternative energy technologies, the renewable energy sector became a potentially good investment (Schwartz, 2011). When investing on an energy project, payback and ROI plays an important role in the decision making process. Payback from renewable energy in terms of percentage ROI is provided in Figure 1.

In terms of expected returns, Robeco predict returns that are below their prior long-term estimates for 2013-2017, though they believe risk premiums relative to safer assets remain very attractive over the next 5 years. These expected returns are shown in Table 3.

Figure 1: Payback from renewable energy in terms of percentage return on investment



Source: Schwartz (2011)

Table 2: Matrix of summary and comparison of project evaluation techniques

Criteria	PBP	ROI	IRR	NPV
Does it consider the entire lifetime of the investment?	No	Yes	Yes	Yes
Does it consider the time value of money?	No	No	Yes	Yes
Can risk levels be included in the feasibility evaluation?	No	Yes	Yes	Yes
Can risk level be included in the selection of mutual exclusive projects?	No	No	No	Yes

Source: Beck et al. (2013). PBP: Payback period, ROI: Return on investment, IRR: Internal rate of return, NPV: Net present value

The average return in the emerging markets is around 7.5% as seen in the Table 3. Based on research conducted in Europe, the average return on renewable energy investments between 7-8% can be considered. In Turkey, the minimum ROI and IRR expectation is still at least 14% and the minimum PBP is expected to be within 7-8 years. The reasons behind the Turkish ROI expectations to be almost double of what it is in the international arena can be explained through two main phenomenon;

- The investments in Turkey having higher costs associated with funding due to the used sources by local as well as foreign banks being outside of the country
- The risk perception being high due to Turkey being in the developing countries category and the investors expecting and having a habit of a higher return.

When the historical progression of the licenses in the Turkish power production is observed, it can be seen that most of them are terminated/cancelled due to;

- Cancellation of the construction as a result of local community objections, mainly with respect to environmental concerns, after getting permission to be abstained from the environmental impact assessment.
- Incorrect feasibility studies with the reasons of;
  a. Utilization of insufficient project evaluation criteria
  b. Misconceptions on cash flow estimations
  - Errors associated with cash inflow estimates: The negative possibilities in the cash inflow predictions are being disregarded and not taken into account. This causes issues with credit payback to the bank after the project takes off
  - Mistakes associated with the investment costs: The unforeseen construction equipment costs which increase the investment costs significantly.

These resulted in the selective approach and higher deposit requirements of the banks compared to the previous years, due to the banks' diminished trust in the conducted project evaluations of the companies based on the aforementioned reasons.

Table 3: Robeco's expected returns of 2013 compare with the forecasts of the previous year's report

Asset class/indicator	Expected returns (%)		Higher
	2014-2018	2013-2017	or lower?
Inflation	2	2.5	Lower
Investment grade government bonds	0.5	0.75	Lower
Investment grade credits	1.5	2.5	Lower
Emerging market debt	3.5	4.0	Lower
High-yield bonds	3.5	4.0	Lower
Private equity	6.25	6.75	Lower
Commodities	4.0	4.25	Lower
Developed world equities	6.75	6.75	Equal
Emerging market equities	7.25	7.75	Lower
Listed real estate	5.25	5.75	Lower

Source: Janssen (2013)

- As more investment experience is gained in the power production projects, the investors have terminated their licenses since the project have not met their initial expectations and prerequisites.

It should also be noted that, in addition to the aforementioned factors, significant cash input reductions occurred in this sector with respect to lower power production levels associated with the changes in the environmental impact assessment regulations. This is caused by a clause in the water utilization agreement by the General Directorate of State Hydraulic Works that states 10% of the average flow is needed to be conserved in the riverbed as sap water to preserve the current state of nature and wildlife. Previously, this was interpreted as 10% of the water from the creeks/rivers at that particular time. However, due to the environmental concerns and reactions, the interpretation was revised as 10% of the minimum annual average of the preceding years. When the annual averages are considered, optimizations are usually conducted with respect to water usage associated with hydroelectric power plant development as well as power production and costs. A large portion of the water from the overflow is not utilized for power production. This new interpretation, compared to the previous one, added the overflows into the annual average calculations and therefore forced people to conserve extra amounts of water in periods without any overflows. In addition, even with the exemption of environmental impact assessment report, the "Ecosystem Evaluation Report" was mandated where it reinforced the statement of keeping over 10% sap water.

Before the environmental impact assessment regulation (No. 26939, dated 07/17/2008), the projects with installed capacity under 10 MW would not require EIA Report or Project Promotion Files (due to being exempt from EIA process) and the amount of water kept in the riverbeds for the preservation of wild life would be determined with respect to the feasibility reports. The General Directorate of State Hydraulic Works, General Directorate of Environmental Impact Assessment and Planning, and the Directorate of Nature Conservation and National Parks evaluated the issue together and reached an agreement with respect to clause in the established regulations regarding the amount of water left in downstream for the preservation of wildlife. In this regard, the procedures and principles applied in water utilization rights agreement to be held between The General Directorate of State Hydraulic Works and legal entity, as part of the Procedures and Principles with respect to Signing Water Utilization Rights Agreement for Productive Activity in Electricity Market (No. 27323, dated 02/18/2009); the calculation of the amount of water kept in the downstream for preserving wildlife is conducted with respect to hydraulic based instream flow method, also known as "Tenant (Montana) Method." Here, the amount of water to be kept in downstream to conserve the wildlife is agreed to be at least 10% of the average of the previous 10 years.

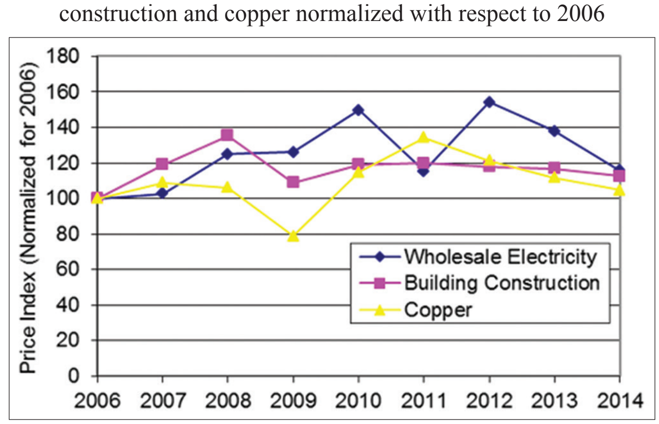
Moreover, in the aforementioned regulation, a clause was also placed that stated "…this amount can be increased if found insufficient when the ecological needs are taken into account in the EIA process," indicating that the definitive judgment can be made in the EIA process. An "Ecosystem Evaluation Report" is required in the EIA process for the preservation of wildlife. In this report, academicians and specialist from various occupations (ecologist, wild life expert, hydro-biologist, hydro-geologist, CBS specialist, geologist etc…) evaluate the potential impact on the flora and fauna and determine the diversity of the ecosystem, types of habitat, sensitivity, exceptionality and preservation priority as well as the impact on the future activity on the ecosystem and habitat, water requirements and precautions using meteorological data.

Finally, the changes in the wholesale electricity, energy prices and construction costs are evaluated in order to determine their impact on the termination and cancellation of licenses. In this period, the termination and cancellation of these licenses would make economic sense if the energy prices have been lowered more than the investment costs. In this regard, an analysis has been conducted with respect to wholesale electricity price and building construction costs in Turkey as well as the international copper price, since 2006. In this analysis, the price/costs are converted into USD based on the TL parity of the corresponding year. Electromechanical costs and construction costs are usually accepted as the main costs associated with the power plant investments. International copper prices can be used as indicators for the electromechanical accessory costs. As seen in Figure 2, when 2006 is selected as the base year (to be normalized), the increase associated with the wholesale electricity price does not drop below the construction costs and copper prices, and remain relatively constant until the final evaluated year of 2014. Thus, it can be concluded that the changes in income and investment costs over the years do not play a significant role in the termination and cancellation of electricity production licenses.

In addition, based on the conducted analysis and evaluation of the emerging markets in terms of capital flows and funds, it was determined that even though the capital flows to the emerging markets have been diminishing throughout the world, Turkish banks have been receiving robust banking flows even after the 2008 crises (IIF Report, 2015). Thus, it was concluded that the termination and cancellation of the licenses cannot be attributed to any potential negative changes in the banking sector.

As a result of the aforementioned factors, the changes in the number of accepted and terminated licenses in various power

Figure 2: The price index of wholesale electricity, building construction and copper normalized with respect to 2006



Source: EPDK Annual Report (2014) and Matriksdata (2014)

Table 4: The number of accepted licenses for various power production techniques in Turkey between 2008 and 2014

Year	Thermal	Hydro	Wind	Geothermal	Unidentified	Biomass	Total
2008	30	167	47	2	69	4	319
2009	26	134	2	1	17	3	183
2010	23	92	6	4	58	7	190
2011	62	161	121	11	59	9	423
2012	71	106	67	7	46	10	307
2013	32	40	7	2	15	5	101
2014	268	14	3	1	28	8	322

Source: EPDK Annual Report, 2014

Table 5: The number of terminated and cancelled licenses for various power production techniques in Turkey between 2008 and 2014

Year	Thermal	Hydro	Wind	Geothermal	Unidentified	Biomass	Total
2008	6	15	13	0	18	0	46
2009	18	22	2	0	0	0	24
2010	5	22	6	0	4	1	33
2011	5	40	8	0	0	0	48
2012	8	23	6	0	23	0	52
2013	12	24	7	0	2	3	39
2014	6	35	10	1	5	1	56

Source: EPDK Annual Report, 2014

production methods between 2008 and 2014 are provided in Table 4. Moreover, the total number terminated and cancelled license in this time period are also provided in Table 5. Thus, a survey has been conducted to further understand the underlying process behind these aforementioned issues.

3. RESULTS

As a result of the conducted survey, the following results are obtained by collecting the responses of the participants from various companies.

3.1. Acquiring Technical Support When Preparing Project Feasibilities

This question was answered as yes by all participants. All participants also say yes to the support, construction and technical equipment during feasibility preparation and the financial analysis is generally conducted by the employed financial specialists. Financial specialists especially prepare the financial analysis and cash flow tables wanted by the banks.

3.2. Choosing the Financial Assessment Tools Being Used in Feasibility Studies

All companies responded that they use PBP and IRR on their energy investment projects. It is seen that the local energy companies that are in business in Turkey do not consider the NPV method for the most part, even though NPV is usually calculated by the financial specialists (75% of the company's state that they calculate NPV). On the other hand, the executive board members should mainly focus on the capital return, where they should choose to pay attention to the ROI, which 50% of the participants stated that they do.

State Hydraulic Work (DSI) uses annual revenue/annual cost ratio as their project evaluation method for evaluating hydroelectric power plants. This ratio is calculated by discounting annual cash inflows with 9.5% and dividing it into the annual cash outflow (which is also discounted by the same percentage). DSI has been evaluating their projects in this same benchmark for years and ranked the profitability of these projects. When projects the companies develop on their own as well as the ones prepared by DSI are being approved by DSI due to revisions, they present the annual revenue/annual cost ratios. The specialists and managers working in the energy investment firms with DSI roots mainly prefer to use this ratio, while the upper managers and the partners of the firms in the decision making positions use the PBP and IRR.

3.3. Considering the Impact of Financial Leverage Caused by Using Liabilities

75% of the participating companies stated that they consider the impact of capital use and liabilities on their project evaluation tools. The companies who have relatively limited financial sources use PBP and IRR in their small scale energy investments and do not usually consider the effects of the financial leverage caused by liabilities. However, during loan applications from banks, the financial specialists employed by the company calculate the feasibility work and cash flow tables requested by the banks. It can be determined that the financial leverage effects are considered in the decision making process mainly by companies that can do large scale investments and can use easy and cheaper liabilities.

3.4. Using Discounted Cash Flow

The companies with limited financial sources finance their small scale projects, since they are mainly entrepreneurs and have limited knowledge on the depths of financial analysis methods and they only use discounted cash flows as it is within the project information requested by banks. On the other hand, the companies with relatively easy access to resources and the ones with high capital conduct analysis by discounted project cash flows since they employ financial specialists as well as educated upper managers.

3.5. Considering the Project Risks in the Analysis

The small scale companies consider the risk analysis mainly by focusing on the increase in their costs. It is a reality that the decrease in cash inflow with respect to production and the potential problems associated with loan payback due to not having the expected production after the project comes to life may be disregarded by the local investors in Turkey because of the optimistic perspective of the entrepreneurs.

For example, the expected and calculated power production in project development and license application period have not attained after the project came to life and significant problems with respect to paying back the loans occurred during many hydroelectric power plant investments in 2014. Among the reasons behind these problems, the main ones are determined to be the discrepancy in the calculated and actual project costs as well as not having the expected production and cash inflows. It is found that the long-term historical statistics and averages are usually utilized predominantly in the conducted calculations without taking the seasonal/yearly variations into account. Furthermore, the range of risks associated with the discrepancy of the important variables and factors are not analyzed and simulated properly, resulting in incomplete and misleading expected value calculations and cash inflows. It can be said that, in power production investments, project risks are evaluated mainly by project costs and corresponding cash outflows in small and large scale investors.

3.6. The Success of Project Feasibility in the Projects Being Taken on

In the projects that are being taken on, the success of project feasibility during project development and decision making period is determined to be partially successful by 37.5% of the participants, whereas 50% responded with successful and 12.5% responded with very successful. Based on the author's knowledge on the sector, it is known that these success rates are actually lower. On the other hand, since the private sector does not have a long energy investment history, companies and investors acquired experience quickly and by learning from the mistakes of the initial project feasibility values and assumptions, they came up with more accurate predictions and increase the success rate of their feasibility.

The results of the conducted survey indicated that the estimated PBP changed from 5 years with 20% IRR to 7-8 years with 14% IRR in the past decade.

4. CONCLUSIONS

Energy sector has gone under a significant change over the past decade with considerable number of increase in the investment terminations and cancellations that are related to low IRR and long PBPs. Even though there are usually more projects available for selection than can be undertaken within the financial (and various others) constraints of a company, it is imperative to limit the decisions with the ones that can create a profitable portfolio. Thus, various evaluation techniques are being used to estimate, evaluate and choose the right projects. Usually, a project in this sector is evaluated by subtracting the costs from the benefits while taking the time value of money and project related risk into account. If the NPV of the investment is positive, PBP is not too long and IRR is not too close to the used discount rate and if the appropriate variant of the ROI is not too low, companies usually make the decision to invest on the associated project. However, even though most companies go through these calculations, their priorities on the decision making process different significantly. Thus, a survey with a wide range of questions is provided to various companies in the energy sector to gain a deeper understanding on the project evaluation methods applied by them. Based on the conducted survey along with the feedback received from company owners and senior management of the firms in the energy sector, the following conclusions are made;

- The investments are determined to be terminated or cancelled mainly due to objections from the local community, incorrect feasibility study calculations, diminished trust in the conducted project evaluations
- Significant cash input reductions occurred in this sector with respect to lower power production levels associated with the changes in the environmental impact assessment regulation interpretations
- The changes in income and investment costs did not play a significant role in the termination and cancellation of electricity production licenses
- Even though the capital flows to the emerging markets have been diminishing throughout the world, it was determined that this was not the case for Turkey
- Companies acquire technical support that may be insufficient or misleading when preparing project feasibilities
- All companies use PBP and IRR on their investment projects. However, although the NPV method is utilized in the financial calculations, their results were not used in the decision making process by top level management in local energy companies in Turkey
- The companies who have relatively limited financial sources use PBP and IRR in their small scale energy investments and do not usually consider the effects of the financial leverage caused by liabilities
- The beneficial effects of financial leverage are taken into account mainly by companies that can do large scale investments and can use easy and cheaper liabilities
- The small scale companies consider the risk analysis mainly by focusing on the increase in their costs without taking the probability of losses associated with cash inflows into account
- The success of project feasibility during project development and decision making period is determined to be partially successful (37.5%) successful (50%) and very successful (12.5%) based on the responses of the participants.

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