FINAL

An Impact Assessment of FRDC Investment in Project 2012-225: Technical Reviews of Formal Harvest Strategies

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Researcher Contact Details

Name:	Joseph Abell
Address:	Suite 36, Benson House,
	Toowong QLD 4066
Phone:	07 3870 4047
Fax:	07 3371 3381
Email:	joseph@agtrans.com.au

FRDC Contact Details

Address:	25 Geils Court
	Deakin ACT 2600
Phone:	02 6285 0400
Fax:	02 6285 0499
Email:	frdc@frdc.com.au
Web:	www.frdc.com.au

In submitting this report, the researcher has agreed to FRDC publishing this material in its edited form.

Contents

List of Tables

List of Figures

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Crispian Ashby, Project Manager, Fisheries Research and Development Corporation

Abbreviations

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
AFMA	Australian Fisheries Management Authority
CRRDC	Council of Rural Research and Development Corporations
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry
DAWR	Department of Agriculture and Water Resources (Commonwealth)
FRDC	Fisheries Research and Development Corporation
HSP	Harvest Strategy Policy
MEY	Maximum Economic Yield
MSY	Maximum Sustainable Yield
OCS	Office of the Chief Scientist
R&D	Research and Development
RD&E	Research, Development and Extension

Executive Summary

What the report is about

This report presents the results of an impact assessment of a Fisheries Research and Development Corporation (FRDC) investment in Project 2012-225 *Technical Reviews of Formal Harvest Strategies*. The project was funded by FRDC, CSIRO and the Department Agriculture and Water Resources from September 2012 to February 2013.

Methodology

The project was analysed qualitatively within a logical framework that included brief descriptions of activities and outputs, outcomes, and impacts. Impacts were categorised into a triple bottom line framework. Principal impacts were then considered for valuation.

Results/key findings

None of the identified impacts were valued. It is expected that the Commonwealth Government fisheries management and stakeholders in the Australian Wild Catch Fisheries sector will be the primary beneficiaries of the investment.

Investment Criteria

Total funding from all sources for the project was $0.50 million (present value terms). However, none of the benefits identified were valued in monetary terms so that the full set of investment criteria were not estimated or reported as part of the impact assessment.

Conclusions

While the investment did not result in any impacts that could be valued at this time, the investment has provided a vital input to the harvest strategy policy review, that is informing the new Commonwealth harvest strategy policy to be released. The potential improved harvest strategy policy can be considered by management of individual Commonwealth fisheries. The expected management changes are likely to contribute to improvement in the long-term economic viability, profitability, and sustainability of Commonwealth fisheries.

Keywords

Impact assessment, fisheries management, Commonwealth Fisheries Harvest Strategy Policy

Introduction

The Fisheries Research and Development Corporation (FRDC) required a series of impact assessments to be carried out annually on a number of investments in the FRDC research, development and extension (RD&E) portfolio. The assessments were required to meet the following FRDC evaluation reporting requirements:

- Reporting against the FRDC 2015-2020 RD&E Plan and the Evaluation Framework associated with FRDC's Statutory Funding Agreement with the Commonwealth Government.
- Annual Reporting to FRDC stakeholders.
- Reporting to the Council of Rural Research and Development Corporations (CRRDC).

The first series of impact assessments included 20 randomly selected FRDC investments worth a total of approximately $6.31 million (nominal FRDC investment). The investments were selected from an overall population of 136 FRDC investments worth an estimated $24.98 million (nominal FRDC investment) where a final deliverable had been submitted in the 2015/16 financial year.

The 20 investments were selected through a stratified, random sampling process such that investments chosen spanned all five FRDC Programs (Environment, Industry, Communities, People and Adoption), represented approximately 25% of the total FRDC RD&E investment in the overall population (in nominal terms) and included a selection of small, medium and large FRDC investments.

Project 2012-225: *Technical Reviews of Formal Harvest Strategies* was selected as one of the 20 investments and was analysed in this report.

General Method

The impact assessments followed general evaluation guidelines that are now well entrenched within the Australian primary industry research sector including Research and Development Corporations, Cooperative Research Centres, State Departments of Agriculture, and some Universities. The approach includes both qualitative and quantitative descriptions that are in accord with the impact assessment guidelines of the CRRDC (CRRDC, 2014).

The evaluation process involved identifying and briefly describing project objectives, activities and outputs, outcomes, and impacts. The principal economic, environmental and social impacts were then summarised in a triple bottom line framework.

Some, but not all, of the impacts identified were then valued in monetary terms. Where impact valuation was exercised, the impact assessment uses Cost-Benefit Analysis as its principal tool. The decision not to value certain impacts was due either to a shortage of necessary evidence/data, a high degree of uncertainty surrounding the potential impact, or the likely low relative significance of the impact compared to those that were valued. The impacts valued are therefore deemed to represent the principal benefits delivered by the project. However, as not all impacts were valued, the investment criteria reported for individual investments potentially represent an underestimate of the performance of that investment.

Background and Rationale

Background

At the Commonwealth level, fisheries management has an explicit objective to maximise the net economic returns to the Australian community through the appropriate use of fisheries resources, and at the same time ensure fish stocks remain at safe and productive levels. There are currently ten Australian wild catch fisheries managed by the Australian Fisheries Management Authority (AFMA).

The 2007 harvest strategy policy for Commonwealth managed fisheries (DAFF, 2007) provided a consistent framework for using the available information about particular fish stocks and applying an evidence and risk-based approach to setting harvest levels on a fishery-by-fishery basis. The policy also provided the industry and its other stakeholders with an operating environment where fisheries management decisions for key species were consistent and transparent.

A harvest strategy is defined in the 2007 harvest strategy policy as:

- a process for monitoring and conducting assessments of the biological and economic conditions of the fishery; and
- rules that control the intensity of fishing activity according to the biological and economic conditions of the fishery.

The Harvest Strategy Policy (HSP) states a set of defined principles to provide a framework for the development of harvest strategies for the management of individual fisheries. A review of the 2007 HSP was sort to ensure improvements could be made.

Rationale

The 2007 HSP had been widely acknowledged as a key driver of improvements in the performance of Commonwealth fisheries. The HSP had cultivated a transparent, evidence and risk-based approach to setting targets and limits for assessing a wide range of fish species and was considered an example of world's best practice for managing fisheries.

In 2012, a review of the HSP was already underway before this project was funded by FRDC. The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) and the Department of Agriculture Fisheries and Forestry (DAFF) consulted with various Commonwealth agencies, scientists, economists, and stakeholders regarding the HSP and identified areas where it might be improved. The current project was funded to ensure past and current research findings were taken into account in the review and by providing technical advice on those areas where potential improvement in strategies could be targeted.

It was anticipated that the project would contribute to continued improvement in management of Commonwealth fisheries and inform the revision of the updated HSP. The issues to be addressed were identified as leading to difficulties in the development or implementation of harvest strategies under the 2007 harvest strategy policy.

The project was relevant to DAFF's review of the bycatch policy and to FRDC Project 2010-061: *Development of a National Harvest Strategy Framework.*

Project Details

Summary

Project Code: 2012-225

Title: *Technical Reviews of Formal Harvest Strategies*

Research Organisation: CSIRO

Principal Investigator: Malcolm Haddon, Principal Fisheries Scientist

Period of Funding: September 2012 to February 2013

Objectives

The project included six objectives:

1. Provide a technical review of recent research on fisheries harvest strategies (both in Australia and overseas) so as to identify information, methods or strategies that may help to address key issues identified by the review of the Commonwealth Fisheries Harvest Strategy Policy.
2. Identify further research required to update the harvest strategies used for Australian fisheries.
3. Provide technical advice on how the harvest strategy policy (including the Guidelines) might be revised in the light of the review conducted in this project and, where relevant, suggest associated technical refinements of the Policy's wording.
4. Identify alternative indicators of economic performance.
5. Provide a detailed review of the implementation of the policy, including the identification of potential performance measures.
6. Draft a technical overview paper for consideration by stakeholders and Australian Government agencies as part of the review of the policy.

Logical Framework

A logical framework for the project is provided in Table 1.

Table 1: Logical Framework for FRDC Project 2012-225

Activities and Outputs	• Four separate papers, written by CSIRO and ABARES, were produced for the Technical Review of the Formal Harvest Strategy Policy (HSP). These papers covered a range of technical issues including the harvest strategies, the regulated catch and by catch, and issues associated with economics, implementation and policy. The general aim of the papers was to review the past and current literature regarding the Commonwealth Fisheries HSP and provide recommendations on how the HSP could be improved. A description of the four papers follows: ***1. Technical Reviews for the Commonwealth Harvest Strategy Policy (Haddon et al., 2012)*** • The first paper looked at a broad range of issues with the 2007 HSP and included the importance of reference points including Total Allowable Catch (TAC), specific Harvest Strategies, and by-catch. Technical reviews were also carried out for each issue. • The review noted that the 2007 HSP had been largely successful, with the policy exceeding international best practice.

- It was recognised that there needed to be guidance for control rules that link empirical indicators with management responses for data-poor/low-value stocks. Also recognised was that there is a trade-off between better information and resource requirements.
- It was noted that, as the 2007 HSP stopped fishing of overfished stocks, there was limited information available produced for these species to be able to determine their biomass (as they recovered?). The paper recommended that, as research in the Australian Fisheries Management Authority (AFMA) is based on a cost recovery method, there should be a new way of funding research for recovering stocks.

2. Technical Reviews for the Commonwealth Harvest Strategy Policy: Economic Issues* (*Vieira & Pascoe, 2012)

- The second paper included an economic review of Maximum Economic Yield (MEY) and the associated issues of calculating MEY. The findings suggested that MEY should be updated to potentially include both downstream and upstream businesses.
- The review recommended that MEY be retained as a measurement for determining biomass, as the MEY measurement was found to give the most viable reading for economic efficiency as it considers effort of the catch as well as biological considerations.
- It was identified that several alternative measurements and proxies for MEY, such as Maximum Sustainable Yield (MSY), are too difficult to estimate when using biological models. The review recommended incorporating existing economic and biological data into MEY models.

3. *A Technical Review of the Implementation of the Commonwealth Fisheries Harvest Strategy Policy* (*Ward et al., 2013)*

- The implementation of the 2007 HSP was reviewed to investigate what had been/had not been successful. Overall, the review found that while the HSP worked well, there were some key issues needing further consideration.
- The review provided a case study on each Commonwealth fishery and how it had implemented the HSP. Each case study also identified particular issues involved in implementing the HSP in each fishery.
- An example was the Northern Prawn Fishery which implemented MEY for most species. While this had been successful, the review recommended that more economic data be used for the MEY model
- It was noted that harvest strategies were implemented for all fisheries, but were not routinely run for small or data-poor fisheries. Also, for some species, no HSP had been implemented due to having a low value or being data poor.

4. *Technical reviews for the Commonwealth Harvest Strategy Policy: Technical Overview* (*Penney et al, 2013)*

- The fourth paper reviewed the previous three papers (described above) and summarised recommendations of where the focus should lie for the next HSP.
- The technical overview suggested that research on MEY may not be appropriate for all fisheries; in particular, MEY may not be worthwhile for small/low-value fisheries.
- Certain species may need a different MEY and MSY "rule of thumb" to allow consideration of differences in biological stock recovery and their role in the ecosystem.
- The technical overview suggested that that research on MEY may not be appropriate due to costs. A more practical approach was suggested to assessing MEY, such as using fishing targets, and to use existing economic data to improve the accuracy of stock estimation.
- The report also suggested that further research be carried out on new data gathering methods for data-poor stocks.

	• The project noted that the 2007 HSP included unrealistic timelines for the recovery of some fish species as the HSP stated a default recovery timeframe of 10 years for all species. It was recommended that a more pragmatic approach be considered that takes into consideration differences in growth of stocks, and changes in biological productivity. • Further, the overview recommended that 'discarding and incidental catch' be considered when calculating TAC and quotas in the future and that the HSP be updated to incorporate new developments in fisheries literature.
Outcomes	• The project findings and recommendations were used in the Commonwealth Fisheries HSP review, published in May 2013. • A recently funded FRDC Project (2016-234: *Guidelines for the updated Harvest Strategy Policy*) is incorporating the recommendations from project 2012-225 into the new guidelines for the 2017 HSP. • Potentially less expensive methods of MEY used (such as better proxies) to get a MEY estimate for fisheries. • Estimates for recovery of overfished stocks will now be based on periods for individual stocks, ensuring a reasonable MEY or MSY can be met. • 'Incidental catch' in biomass assessments has been included in the new HSP to fully consider the biomass of stock. This has led to a reduction in the TAC for non-targeted species in a multi-catch fishery. • 'Discards' are now included as part of biological stock assessments and part of quotas for fishers. • An improvement in guidelines regarding overfishing and overfished stocks has been made. The new guidelines will allow an overfished stock to have a specific recovery plan relevant to that fish stock. • The project findings will benefit the long-term economic performance and sustainability of Commonwealth fisheries. • Components of the findings also may be considered and used by non-Commonwealth Australian fisheries management agencies through linkages with the National Harvest Strategy Framework project. • Increased confidence in Commonwealth fisheries management is likely to be gained by fisheries' stakeholders from findings associated with incidental catch and risk management.
Impacts	• Continued maintenance of the Australia's international reputation for best practice concerning management of its wild catch fisheries, including its harvest strategies. • Contribution to potential improvement in the long-term economic viability, profitability and sustainability of Commonwealth fisheries because of fisheries management adopting the improved HSP and associated guidelines; in turn, this will benefit fishers and the supply chains to which they contribute. • Potentially improved recovery of overfished stocks through more flexible recovery periods and maximum economic yields. • Contribution to the maintenance of the social licence to fish. • Contribution to improved management of fisheries in other Australian jurisdictions.

Project Investment

Nominal Investment

Table 2 shows the annual investment for the project funded by FRDC, CSIRO, and the Department of Agriculture and Water Resources. Investment from Project 2012-225.20 has been included in Table 2, as these were funds directly related to the activities of the Technical Harvest Strategy reviews.

Table 2: Annual Investment in the Project 2012-225 (nominal $)

Year ended 30 June	FRDC ($)	OTHER ($)	TOTAL ($)
2013	107,989	236,270	344,259
2014	0	0	0
2015	0	0	0
2016	41,999	0	41,999
Totals	149,988	236,270	386,258

Program Management Costs

For the FRDC investment the cost of managing the FRDC funding was added to the FRDC contribution for the project via a management cost multiplier (1.115). This multiplier was estimated based on the share of 'employee benefits' and 'supplier' expenses' in total FRDC expenditure reported in the FRDC Cash Flow Statement (FRDC, 2016). This multiplier then was applied to the nominal investment by FRDC shown in Table 2.

For the other investment, it was assumed that the management and administration costs for the project were already built into the nominal amounts reported in Table 2.

Real Investment and Extension Costs

For the purposes of the investment analysis, the investment costs of all parties were expressed in 2016/17 dollar terms using the Implicit Price Deflator for Gross Domestic Product (ABS, 2016). No additional costs of extension were included as the findings were directly applicable to Commonwealth Fisheries managers.

Impacts

Table 3 provides a summary of the principal types of impacts identified and listed in Table 1 and categorised into economic, environmental and social impacts.

Table 3: Triple Bottom Line Categories of Potential Impacts from Technical Reviews of Formal Harvest Strategies

Economic	• Contribution to potential improvement in the long-term economic viability, profitability and sustainability of Commonwealth fisheries because of fisheries management adopting the improved HSP and associated guidelines. • Potentially improved recovery of overfished stocks through more flexible recovery periods and settings for maximum economic yields.
Environmental	• Improvement to the sustainability of Australian wild catch fisheries.
Social	• Maintenance of the Australian reputation for well-managed fisheries through continued attention and improvement to harvest strategy policies. • Contribution to the maintenance of the social licence to fish. • Enhanced regional community well-being through the spill-over effects of increased profitability and sustainability for the Australian wild catch fisheries sector.

Public versus Private Impacts

Impacts identified in this evaluation are both public and private. Improved harvest strategies will benefit businesses operating in Commonwealth managed Australian wild catch fisheries and is therefore a private impact. In addition, public interests are served by improving the environmental sustainability of the fisheries, maintaining or enhancing the positive reputation of Australian fisheries management and the social licence to fish, and any community spillovers from the profitability of fishers.

Distribution of Private Impacts

Private benefits initially will be captured by fishers where fisheries management improve their harvest strategies as a result of the technical reviews and recommendations. It can be assumed that the final distribution of some of the benefits from the investment will be distributed between participants along parts of the wild catch fisheries supply chain, including fishers, post-harvest and final consumers.

Impacts on other Australian Industries

It was assumed that the impacts from the investment in project 2012-225 will be focused on Commonwealth fisheries, but it is likely that there may be relevant spillovers to Australian fisheries managed by other jurisdictions.

Impacts Overseas

As the technical papers and reports have been published it is likely that the sharing of new knowledge and perspective may lead to improved fisheries management in overseas jurisdictions.

Match with National Priorities

The Australian Government's Science and Research Priorities and Rural RD&E priorities are reproduced in Table 4. The project findings and related impacts will contribute primarily to Rural RD&E Priority 3 and to Science and Research Priority 1 and 2.

Table 4: Australian Government Research Priorities

Australian Government	
Rural RD&E Priorities (est. 2015)	**Science and Research Priorities (est. 2015)**
1. Advanced technology 2. Biosecurity 3. Soil, water and managing natural resources 4. Adoption of R&D	1. Food 2. Soil and Water 3. Transport 4. Cybersecurity 5. Energy and Resources 6. Manufacturing 7. Environmental Change 8. Health

Sources: (DAWR, 2015) and (OCS, 2015)

Valuation of Impacts

Impacts Valued

The project did not produce any quantifiable impacts so no quantitative evaluation processes were applied to estimate benefits.

Impacts not Valued

The impacts identified in Table 5 were not valued for the following reasons (Table 5):

Table 5: Reasons for Not Valuing Impacts

Impact/Potential Impact	Reason why Impact Not Valued
Contribution to potential improvement in the long-term economic viability, profitability and sustainability of Commonwealth fisheries because of fisheries management adopting the improved HSP and associated guidelines.	The new HSP has not been finalised or released at the time of writing, so any new updates to the HSP cannot be accurately predicted. Even if the new HSP was available, the time and resources to undertake valuation were not available to pursue and determine the impacts from changes to the technical harvest strategy reviews. It is likely that the technical review findings and recommendations may be used selectively by different Commonwealth fisheries managers when the new policy is released. Therefore, it would be difficult to generalise outcomes, their associated impacts, as well as their timing and attribution to the technical reviews.
Potentially improved recovery of overfished stocks through more flexible recovery periods and settings for maximum economic yields.	Valuation of this potential impact would have been uncertain as evidence of any impact of changes made will take time to become evident.
Improvement to the sustainability of Australian wild catch fisheries.	Valuation of this potential impact would have been uncertain as evidence of any impact of changes made will take time to become evident.
Maintenance of the Australian reputation for well-managed fisheries through continued attention and improvement to harvest strategy policies.	Difficult to value such an impact in dollar terms.
Contribution to the maintenance of the social licence to fish.	A lack of evidence that any such improvements in the perception of fisheries management has been translated into increased community support for the seafood social licence.
Enhanced regional community well-being through the spill-over effects of increased profitability and sustainability for the Australian wild catch fisheries sector.	Difficult to value regional spillovers, especially when the profitability increases itself can be not be valued with any confidence.

Results

All past costs and benefits were discounted to 2016/17 using a discount rate of 5%. All analyses ran for the length of the project investment period plus 30 years from the last year of investment in Project 2012-225.

Investment Criteria

Tables 6 and 7 show the investment criteria estimated for different periods of benefits and costs for the total investment and FRDC investment respectively. Note that, as no benefits were valued, the investment criteria reporting is restricted to the Present Value of Costs.

In the interests of consistency with other project analyses and reporting, the Present Value of Costs was reported for the length of the investment period plus for different periods up to 30 years from the last year of investment (2015/16).

Table 6: Investment Criteria for Total Investment in Project 2012-225

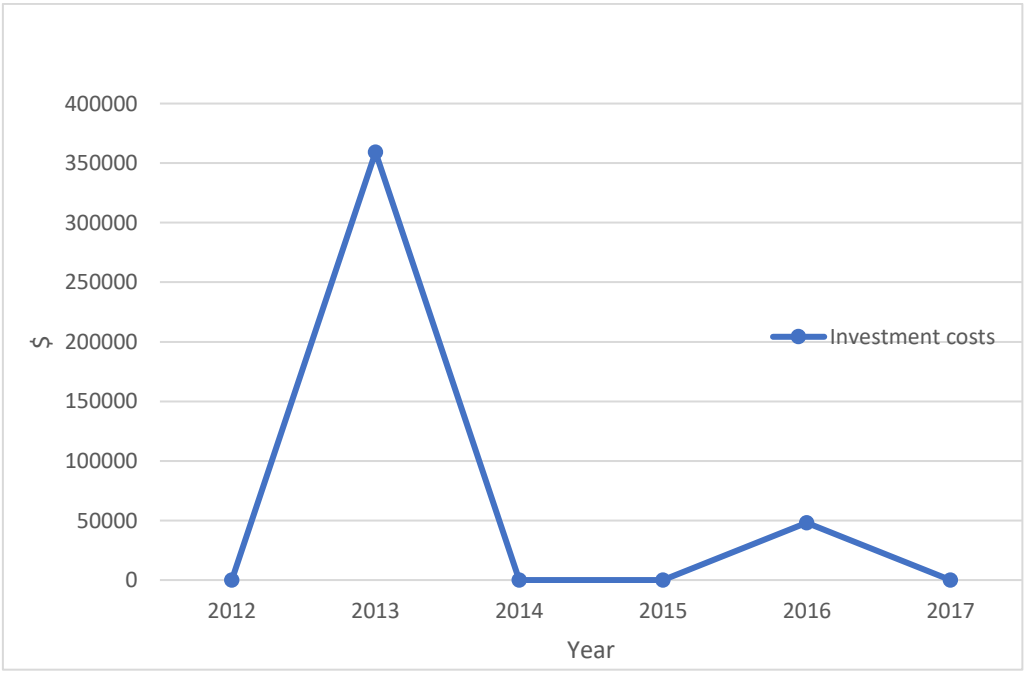
Investment criteria	**Number of years from year of last investment**						
	0	**5**	**10**	**15**	**20**	**25**	**30**
Present value of costs ($m)	0.50	0.50	0.50	0.50	0.50	0.50	0.50

Table 7: Investment Criteria for FRDC Investment in Project 2012-225

Investment criteria	**Number of years from year of last investment**						
	0	**5**	**10**	**15**	**20**	**25**	**30**
Present value of costs ($m)	0.20	0.20	0.20	0.20	0.20	0.20	0.20

The annual undiscounted cost cash flows for the total investment for the duration of investment period are shown in Figure 1.

Figure 1: Annual Cash Flow of Undiscounted Total Costs



Conclusions

Total funding for the investment over the period of the investment totalled $0.50 million in present value terms. The FRDC funding totalled $0.20 million in present value terms. While the investment did not result in any impacts that could be valued at this time, the investment has provided a vital input to the harvest strategy policy review, that is informing the new Commonwealth harvest strategy policy to be released. The potential improved harvest strategy policy can be considered by management of individual Commonwealth fisheries. The expected management changes are likely to contribute to improvement in the long-term economic viability, profitability, and sustainability of Commonwealth fisheries.

Glossary of Economic Terms

Cost-benefit analysis:	A conceptual framework for the economic evaluation of projects and programs in the public sector. It differs from a financial appraisal or evaluation in that it considers all gains (benefits) and losses (costs), regardless of to whom they accrue.
Benefit-cost ratio:	The ratio of the present value of investment benefits to the present value of investment costs.
Discounting:	The process of relating the costs and benefits of an investment to a base year using a stated discount rate.
Internal rate of return:	The discount rate at which an investment has a net present value of zero, i.e. where present value of benefits = present value of costs.
Investment criteria:	Measures of the economic worth of an investment such as Net Present Value, Benefit-Cost Ratio, and Internal Rate of Return.
Modified internal rate of return:	The internal rate of return of an investment that is modified so that the cash inflows from an investment are re-invested at the rate of the cost of capital (the re-investment rate).
Net present value:	The discounted value of the benefits of an investment less the discounted value of the costs, i.e. present value of benefits - present value of costs.
Present value of benefits:	The discounted value of benefits.
Present value of costs:	The discounted value of investment costs.

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