



Economic Evaluation of Disclosure of Origin Requirements

**Report to Ministry of Business,
Innovation and Employment**

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Acronyms and Abbreviations

ABS	Access and Benefit Sharing Schemes
CBA	Cost Benefit Analysis
CBD	Convention on Biological Diversity
CoO	Country of Origin
CRI	Crown Research Institutes
DoO	Disclosure of Origin
EPO	European Patent Office
GR	Genetic Resource
IGC	WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore
IP	Intellectual Property
IPLC	Indigenous People or Local Communities
IPONZ	Intellectual Property Office of New Zealand
MBIE	Ministry of Business Innovation and Employment
MFAT	Ministry of Foreign Affairs and Trade
NPO	National Patent Offices
NPV	Net Present Value
OECD	Organisation for Economic Co-operation and Development
PV	Present Value
PMAC	Patents Māori Advisory Committee
PVR	Plant Variety Right
R&D	Research and Development
SMEs	Small and Medium-size Enterprises
TK	Traditional Knowledge
WIPO	World Intellectual Property Organization

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Executive Summary

The Ministry of Business Innovation and Employment (MBIE) is considering aspects of New Zealand's approach to protecting Genetic Resources (GR) and Traditional Knowledge (TK) in the international Intellectual Property (IP) system.

One approach under consideration is the introduction of a Disclosure of Origin (DoO) requirement on patent and plant variety rights (PVR) applications when using GR or TK. Some possible objectives for the introduction of further DoO requirements have been identified as:

- To obtain more information about the use and potential misuse of New Zealand GR and TK (known as mātauranga Māori)
- To be consistent with the Treaty of Waitangi
- To inform New Zealand's position on Disclosure of Origin at international negotiations.

Castalia was engaged to conduct an economic analysis of the impacts associated with the introduction of mandatory disclosure of origin (DoO) requirements, whether any of the proposed changes would provide a net benefit or cost, and what the value of costs or benefits would be.

The current patent regime has no compulsory DoO

DoO is not currently a requirement on New Zealand patent applications. The system aims to protect Māori interests in New Zealand genetic resources species and mātauranga Māori through the establishment of a Patent Māori Advisory Committee (PMAC). The committee has the role of advising whether an invention claimed in a patent application is derived from Māori traditional knowledge or from indigenous plants or animals and whether the commercial exploitation of an invention described in a patent application might be contrary to Māori values. No applications have been referred to the Patents Māori Advisory Committee since it was established in September 2014.

PVR applications are not currently referred to PMAC and there is no separate process in relation to indigenous plants, or mātauranga Māori. However, these factors may be taken into account by examiners when assessing an application. PVR applications also require a technical questionnaire that includes information around the plants breeding scheme and variety, which may require information about a country of origin to prove the plant variety's novelty.

There are a range of options for implementing change

Options to strengthen DoO requirements range from a statement of current knowledge through to requirements that would almost certainly require applicants to do additional research and comply with international Access and Benefit Sharing (ABS).

The scenarios we have tested in this study are described in Table E.1 and represent three reasonable and possible approaches to change the status quo.

Table E.1: Scenarios of Change

Scenario	Possible Disclosure Requirements
Scenario 1	<ul style="list-style-type: none"> ▪ Country of origin (i.e. where the GR were first found in nature, or the TK first originated from) ▪ If the country is not known or not applicable, a declaration to that effect
Scenario 2	<ul style="list-style-type: none"> ▪ Country of origin of the GR or the Indigenous People or Local Community (IPLC) who supplied the TK ▪ If the country of origin is not known or not applicable, then a declaration to that effect <u>AND</u> ▪ Source, e.g., the gene bank or country the applicant directly obtained the GR, or if the TK had been taken from a publication
Scenario 3	<ul style="list-style-type: none"> ▪ Country of origin of the GR or IPLC who supplied the TK <u>AND</u> ▪ Evidence of compliance with ABS arrangements of country of origin or the IPLC

All three scenarios have direct administrative and compliance impacts

The impacts of changes are rated to assess materiality as measured by the relative impact that the change causes. We have identified material impacts for administration and compliance of the proposals as described in Table E.2. Impacts assessed to have a medium or high impact go on to be quantified.

Table E.2: Materiality of Direct Impacts

Group	Impact	Scenario 1	Scenario 2	Scenario 3
Intellectual Property Office of New Zealand (IPONZ)	Notifying of changes and updating collateral during implementation	Medium	Medium	Medium
	Additional staff training during implementation	Low	Low	Medium
	Development of internal guidance for new processing procedures	Medium	Medium	Medium
	Ongoing time taken to process applications	Low	Low	Medium
	Ongoing change in the number of patents to process	Negligible	Negligible	Low
PMAC	Time taken to assess additional patent applications	Low	Low	Low
NZ Patent/PVR Applicants	Additional time taken for research the requirements of DoO and ABS	Medium	Medium	High
	Additional need for legal consultation	Low	Low	Medium
	Costs associated with ABS compliance	Negligible	Negligible	Medium

Group	Impact	Scenario 1	Scenario 2	Scenario 3
International Patent/PVR Applicants	Overall Compliance Costs (for reference purposes only, international costs not included in Cost Benefit Analysis (CBA))	Low	Low	High

Indirect impacts consider all other potential flow on effects from the changes to all areas of the New Zealand economy

We did not identify any material indirect costs or benefits because:

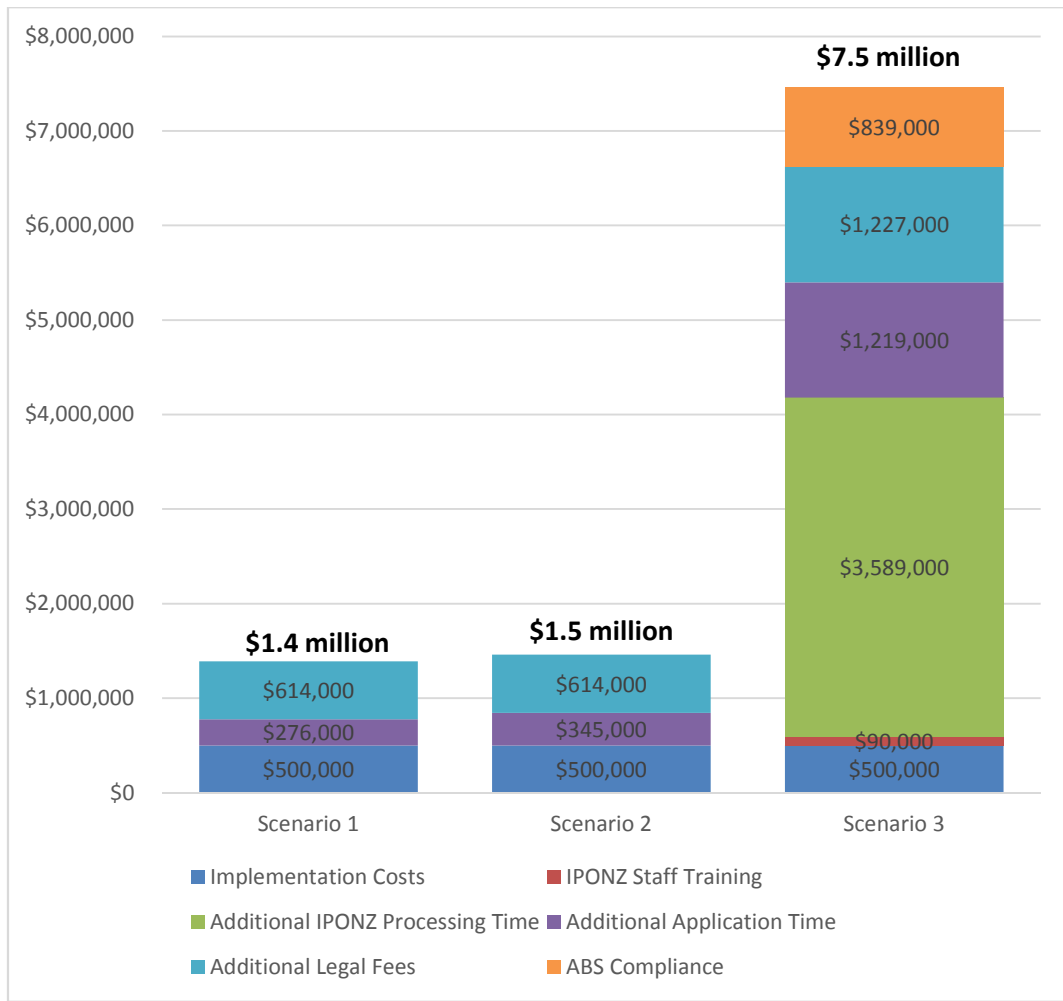
- The relatively small increase in patent application costs is likely to only have a small / insignificant impact on patent volumes overall
- There is unlikely to be any effect on research and development activity in New Zealand as a result of the patent application changes, because of the many other more significant drivers of research and development in New Zealand
- These changes in and of themselves do not cause changes in foreign regulation or regimes, and therefore do not bring about any benefits associated with international benefit sharing.

Therefore, there were no material indirect costs or benefits identified that went on to be quantified.

The present value (PV) of the direct costs associated with the proposed scenarios range from \$1.4 million to \$7.5 million across a 30-year period

Figure E.1 shows the value of the identified material costs. The costs are especially low for the first two scenarios.

Figure E.1: Breakdown of PV Costs for DoO Scenario Options



Varying key assumptions does not alter the overall conclusion

A high degree of uncertainty surrounds these cost estimations. We have therefore varied the key assumptions within plausible ranges to assess the impact that our assumptions have on the results. Key variables tested were:

- The discount rate
- The annual growth rate of patent and PVR applications
- Percentage of patents and PVRs that DoO requirements would apply to
- Amount of legal consultation time incurred per application
- ABS compliance costs
- Percentage of applicants who have to comply with an ABS (captures the number of ABS schemes and the nature of patents).

Table E.3 below shows the top five assumptions that had the biggest impact on PV estimates when varying them within a reasonable range.

Table E.3: Sensitivity Test Results

Model Variable	Sensitivity Range	Scenario One (\$m)	Scenario Two (\$m)	Scenario Three (\$m)
Discount Rate	3-9 percent	1.8 – 1.1	1.9-1.2	10.8-5.5
Patent Application Annual Growth Rate	-2 – 5 percent	1.2 – 1.6	1.3 – 1.7	6.2 – 9.6
PVR Annual Growth Rate	0 – 10 percent	1.2 – 1.8	1.3 – 1.9	6.3 – 10.1
Percentage of Patents Affected by DoO requirements	5 – 30 percent	1.0 – 1.6	1.0 – 1.7	4.3 – 9.6
Percent of Applicants Having to Comply with ABS	1 – 20 percent	No Effect	No Effect	6.8 – 10.0

The present value of costs needs to be traded off against the unquantified intangible benefits

The outcome of this CBA shows that there are small administrative and compliance costs for the first two scenarios, ranging to a more significant cost for Scenario Three.

However, the cost is relatively small, when considered against the PV of a typical regulatory change impacting over a long period, and the uncertainty surrounding this study.

Other factors to consider in the balance of costs and benefits are intangible benefits that can be traded off against the direct costs. These have been identified as:

- An increase in the volume and quality of information regarding the use of GR and TK in New Zealand patent and PVR applications
- Compliance with Treaty of Waitangi considerations
- A clearer international position on the issue of the use of other countries’ GR and TK that could potentially lead to value to New Zealand through reciprocal international relationships.

If the value of these benefits were considered greater than the direct cost identified in this study, then all of the proposed scenarios for change would be beneficial.

1 Background and Methodology

The Ministry of Business Innovation and Employment (MBIE) is conducting a review of New Zealand's approach to protecting Genetic Resources (GR) and Traditional Knowledge (TK) in the international Intellectual Property (IP) system.

MBIE have engaged Castalia to conduct an economic analysis of the costs and benefits associated with the introduction of mandatory Disclosure of Origin (DoO) requirements for New Zealand patent and plant variety rights (PVR) applications. Under the proposed requirements, the origin of GR and TK would need to be disclosed when applying for patents or PVRs.

Possible objectives for the introduction of disclosure of origin requirements are:

- To obtain more information about the use and potential misuse and of New Zealand GR and TK (known as mātauranga Māori)
- To be consistent with the Treaty of Waitangi
- To inform New Zealand's position on Disclosure of Origin at international negotiations.

Patent law has a long history...

The concept of patents and patent law has been around internationally for centuries. The first New Zealand Patents Act was passed in 1860. Patents in New Zealand are granted following an examination process by the Intellectual Property Office of New Zealand (IPONZ). The criteria for grant of a patent are set out in the Patents Act 2013.

The purpose of patents is to encourage technological innovation and invention and to allow for the disclosure of these inventions to the public, by granting the right to exclude others from commercial exploitation of the invention/innovation. This is achieved by providing the potential for profits to be made by exploiting the monopoly that the patent provides or collecting licensing fees from other firms until the term of the patent expires.

The concept and definition of patents and what IP they can cover has expanded significantly and now can cover inventions, products, processes, materials, or how something is made. The exclusive right to an innovation can generally only last for up to 20 years and must be sustained through annual maintenance fees.

Plant variety rights are a similar concept to patents. In New Zealand, PVRs are granted under the Plant Variety Rights Act 1987. A PVR grants the exclusive right to produce for sale and to sell, reproductive material of a plant variety that is new, distinct, uniform, and stable.

There are questions about the fairness of granting exclusive rights to innovations that may be based on the GR or TK of other countries

In 1992 the Convention on Biological Diversity (CBD) was concluded. The CBD provides an international framework relating to the conservation of biological diversity and the sustainable use of those resources, and the fair and equitable benefits arising from the exploitation of genetic resources. New Zealand ratified the CBD in 1993 and there are now 196 parties to it.

Since then, the topic has become a greater issue internationally. In 2010 the Nagoya protocol to the CBD was developed which brought about the concept of Access and Benefit Sharing (ABS). ABS were intended to create greater legal certainty and transparency for providers and users of GR and TK by creating predictable conditions

for the use of GR, such as establishing clear rules and procedures for securing informed consent from the Country of Origin (CoO). The Nagoya Protocol currently has 104 parties, of which New Zealand is not one.

Despite the introduction of the Nagoya protocol, the benefits and compliance with international ABS regimes has been limited. This is in part due to the fact that many countries do not require people submitting patent applications to disclose a CoO (where appropriate). Approximately 20 countries have some form of DoO requirements within their national patent law. These vary from requiring DoO on an application, to demonstrating compliance with the CoO's ABS.

Proponents of DoO argue that disclosure is a crucial defence against misappropriation and will help to restore faith in the patent system. However, some are concerned that it would place a disproportionate burden on inventors, overload the patent system and is ultimately not the appropriate vehicle to combat this kind of misappropriation.¹

In New Zealand we deal with the issue of the use of GR and TK through a Patent Māori Advisory Committee

Although New Zealand does not have an official DoO requirement or an ABS established, a Patent Māori Advisory Committee (PMAC) was established in 2013, with the role of advising whether it considers that the commercial exploitation of an invention described in a patent application might be contrary to Māori values. Any patent applications that IPONZ believe could fall into this category, because the inventions described in those applications involve indigenous plants or animals or Māori TK, may be referred to the Committee for review. The Committee will then advise the Commissioner of Patents on whether they believe that the patent should be accepted or declined. The Commissioner will then need to provide a reason for accepting or rejecting this advice. The decision to accept or reject PMAC's advice is appealable to the High Court.

PVR applications are not currently referred to PMAC and there is no separate process in relation to indigenous plants, or mātauranga Māori. However, these factors may be taken into account by examiners when assessing an application.

New Zealand needs to determine their stance on its international position on the effective protection of TK and GR

Discussions on establishing an international system for the protection of indigenous rights and interests in GR and TK are happening in several international forums.² The main body for these discussions is the World Intellectual Property Organization Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (IGC). The IGC is currently negotiating an international legal instrument (for example a treaty or declaration) relating to GR and TK.

¹ Hoare, A., & Tarasofsky, R. (2007) Asking and Telling: Can "Disclosure of Origin" Requirements in Patent Applications Make A Difference? *Journal of World Intellectual Property*, 10(2), 149-169

² Including the World Trade Organization TRIPS Council and the Conference of the Parties for the Convention on Biological Diversity.

This paper considers the costs and benefits to New Zealand of introducing additional requirements to disclose the origin of GR and TK in patent and PVR applications

The purpose of this study is to investigate all the possible costs and benefits that could arise if New Zealand introduces a DoO condition on all the patents or PVRs applied for in New Zealand. There are three separate scenarios to assess, ranging from requiring applicants to confirm that they have attempted to find the DoO on a patent or PVR application, to having to prove that they have complied with any relevant ABS of that country.

This paper will identify and quantify the impacts, from direct administrative and compliance costs, and the overall effect it may have on research and development (R&D) and the New Zealand economy.

1.1 Our Approach to Economic Evaluation

The steps in our economic evaluation of the DoO requirements are:

- **Step One:** Summarise the status quo that will be used for comparison, and define the three proposed DoO scenarios for evaluation
- **Step Two:** Identify and qualitatively assess the impacts to determine which are material for each of the DoO scenarios
- **Step Three:** Quantify the material impacts and run a sensitivity analysis on the key assumptions and uncertainties.

Each step in this evaluation was informed by research, literature, and consultations with key stakeholders from MBIE, IPONZ, PMAC, Crown Research Institutes (CRIs), and Vision Mātauranga.

Below we define each of these steps in greater detail.

Step One: Define the DoO scenarios for evaluation

The evaluation focuses on the incremental economic impacts from changes to the status quo, (sometimes referred to as the counterfactual) in a cost benefit analysis (CBA).

Therefore, we describe the details and processes involved in the current patent and PVR application regimes. We then clearly define the details of the proposed change scenarios, and any assumptions that we make for this analysis.

The development of the scenarios has been conducted in association with MBIE.

Step Two: Identify all potential impacts that could occur as a result of the changes and identify which ones are material

We impose the scenarios to identify all the potential impact categories that could arise from their implementation, regardless of the potential impact size.

This stage includes identifying both direct and indirect effects. Direct effects relate to costs or benefits that can be directly and specifically attributed to the change in policy. Indirect effects are the flow on effects that can be attributed to the change in policy.

We qualitatively assess all the impact categories to determine the materiality of the impact and determine whether they can be quantified in the context of a CBA.

Materiality is determined based on the likelihood of an event occurring and the scale of the economic impact that the event would cause. The scale of an economic impact can be caused by a small effect on a large amount of people, or a large effect on a small

amount of people. The materiality rating does not relate to a specific monetary value, but rather a relative effect in the context of the other events within the analysis. It also determines the importance of quantifying the impact in the next stage in the analysis.

The overall materiality of the category will be rated based on a combination of the likelihood and the impact as can be seen in Table 1.1.

Table 1.1: Materiality Ratings

	Impact				
		Negligible	Low	Medium	High
Likelihood	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Low	Low	Medium
	Moderate	Negligible	Low	Medium	High
	High	Negligible	Medium	High	High

Step Three: Quantify the material impacts and run a sensitivity analysis of key uncertainties

For each cost or benefit that was assessed as having a high or medium materiality, we quantify them by determining an appropriate quantification method.

Only costs or benefits relating to the New Zealand economy are included in the CBA. For example, direct costs to foreign applicants are not included, however they may still need to be considered for the flow on effects that this could cause to the New Zealand economy.

We input the quantified costs and benefits into a model that determines the Net Present Value (NPV) of all the costs and benefits over the next 30 years. NPV is the present value of the costs net of benefits, discounted over 30 years using Treasury’s recommended discount rate.

In some cases, the quantification of impacts is not possible, for example, cultural benefits, which sometimes remain intangible. This does not necessarily mean that it is not a valuable benefit, therefore it is important that these unquantifiable costs or benefits are identified and noted alongside an NPV result when appropriate.

The assessment of costs and benefits is always subject to a degree of uncertainty. To deal with this uncertainty we conduct a sensitivity analysis which looks at the impact of altering key assumptions made in our quantitative assessment, to determine the degree of impact they have on the overall outcome.

2 What are the Proposed Changes?

The economic impact of complying with DoO requirements will depend on the exact requirements introduced. MBIE have provided three possible scenarios for evaluation that may be implemented.

To assess the effects that can be attributed to the changes, it is necessary to have a thorough understanding of the status quo that they will be compared against. We discuss the current regime including the associated processes and trends. We then discuss each of the implementation scenarios in terms of the changes they would require, the impacts that each could have compared to the status quo, and the materiality of those impacts.

2.1 The Current Regime

Patents can be granted for new products, processes, the material that something is made from, or how something is made. Writing a patent specification is the first step in filing an application and must include a detailed description of the invention and the claim that is being made in regard to the protective boundaries being sought. To be eligible for the grant of a patent the invention must be new, inventive, useful, and not excluded.

Once an application has been filed it is published on the IPONZ website so that other parties can view it and submit a statement if they believe that the invention lacks novelty. The application will then be examined by IPONZ if the applicant requests examination and a report is produced that details any issues that have been identified. Once all issues identified in the examination report have been addressed the patent application can be accepted and will be published in the Journal of Intellectual Property Office of New Zealand. Third parties then have three months to oppose the grant of the patent. If no opposition is filed, or any opposition is resolved in favour of the patent applicant, a patent will be granted.

IPONZ suggest that producing a patent specification and submitting an application is a complex process and recommend that applicants engage a patent attorney.

The current patent regime has no compulsory DoO

DoO is not currently a requirement on New Zealand patent applications, however the system aims to protect New Zealand GR and mātauranga Māori through the establishment of PMAC in 2013. However, no patent applications have been referred to PMAC since it was established.

Figure 2.1 below shows the steps that occur under the current patent application regime.

Figure 2.1: Current Patent Application Regime

PVRs can be applied for by the breeder of a new plant variety

The grant of a PVR will be accepted if it is considered new, distinct, uniform, stable, and an acceptable denomination (i.e. clearly identified, not liable to mislead or confuse, and different from any existing variety or closely related species).

Applications involve providing evidence of ownership, providing a seed sample and completion of a technical questionnaire. The technical questionnaire involves information around the breeding scheme and characteristics of the variety. It does not specifically require the disclosure of origin, but this may be included in the technical report to prove the plant variety's novelty.

PVR applications are not currently sent to PMAC for review in relation to New Zealand GR, or mātauranga Māori. However, these factors may be taken into account by examiners when assessing an application.

IPONZ currently operates under a cost recovery model where application fees are set based on the costs associated with processing applications

New Zealand patent and PVR application fees are relatively low by international standards and have a relatively short processing time. Patents include an annual renewal fee that increases overtime with the aim of discouraging patents that are no longer profitable.

Table 2.1 gives a basic summary of some of the more common application fees currently charged by IPONZ.

Table 2.1: NZ Patent and PVR Costs

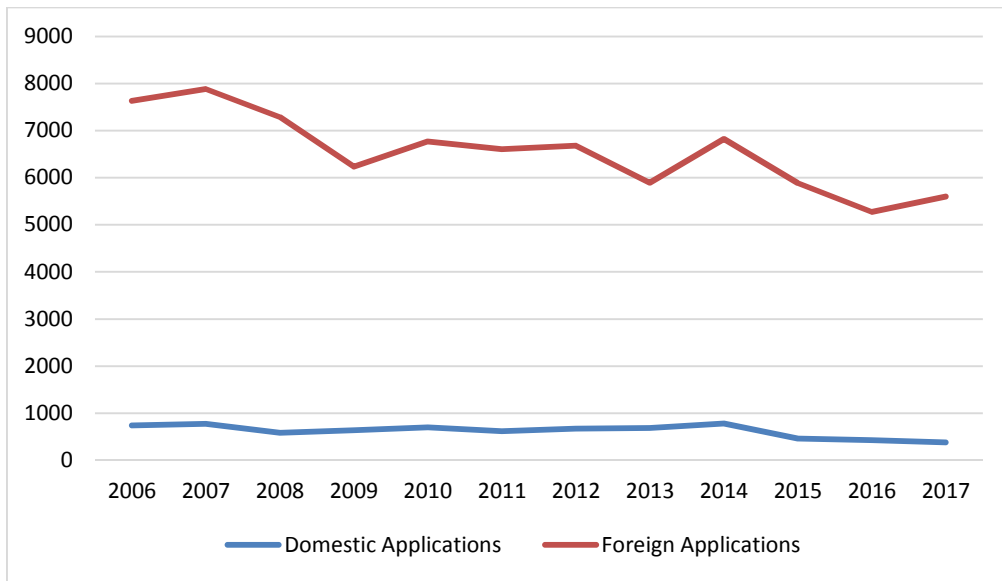
Item	Cost
Patents	
Provisional specification	\$150
Complete specification	\$250
Request for examination of re-examination	\$500
Annual renewal	\$100-\$350
PVR	
Application for grant	\$500
Examination of data	\$600
Test trials	Range from \$450 - \$3,200
Annual renewals fees	\$160

Source: <https://www.iponz.govt.nz/about-ip/patents/fees/>

Patent applications lodged in New Zealand have been decreasing

The number of patents lodged in New Zealand by domestic and foreign applicants over the last 10 years can be seen in Figure 2.2. As it shows, the total number of applications has reduced by approximately 28 percent since 2006, at an average of negative two percent per year. It also shows that the number of applications from foreign applicants is significantly greater than domestic, which make up an average of only nine percent.

Figure 2.2: Number of Patent Applications Over Time

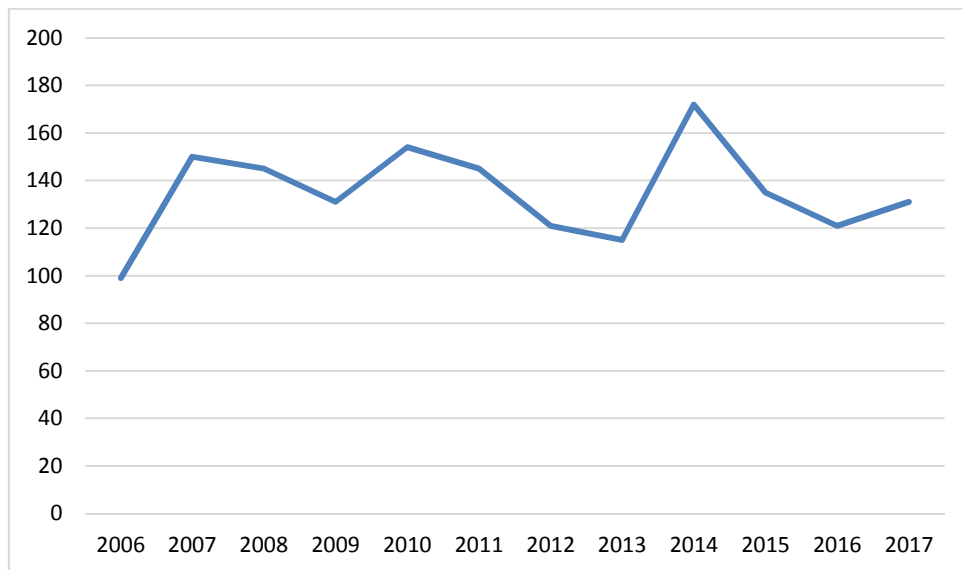


Source: IPONZ Facts and Figures – March 2018

PVR applications lodged in New Zealand have been increasing

Figure 2.3 shows that the number of PVR applications has increased by approximately 32 percent since 2006, at an average of five percent per year. PVR applications are made up of approximately 19 percent fruit and nut, 27 percent herbage, crops, vegetable and fungi, and 54 percent ornamental.

Figure 2.3: Number of PVR Applications Over Time



Source: IPONZ Facts and Figures – March 2018

2.2 We Consider Three Scenarios for Change of Disclosure of Origin Requirements

The three scenarios of DoO requirements being considered in this analysis are presented in Table 2.2 below.

Table 2.2: Scenarios of Change

Scenario	Disclosure requirements
Scenario 1	<ul style="list-style-type: none"> ▪ Country of origin (i.e. where the GR was first found in nature, or the TK first from) ▪ If the country is not known or not applicable, a declaration to that effect
Scenario 2	<ul style="list-style-type: none"> ▪ Country of origin of the GR or the IPLC who supplied the TK ▪ If the country of origin is not known or not applicable, then a declaration to that effect AND ▪ Source, e.g., the gene bank or country the applicant directly obtained the GR, or if the TK had been taken from a publication
Scenario 3	<ul style="list-style-type: none"> ▪ Country of origin of the GR or IPLC who supplied the TK AND ▪ Evidence of compliance with access and benefit sharing arrangements of country of origin or the IPLC

“Source” refers to where the applicant got the GR or TK from, whereas the country of origin refers to where it initially originated. Source would be used in those situations where the origin was unknown, and therefore the source is the entity that is competent to grant access. For example, a plant used in a herbal medicine may have been grown in New Zealand, so New Zealand would be the source. However, if that plant originated in Brazil and was introduced to New Zealand, then the country of origin is Brazil.

All scenarios will have consequences of false disclosure or false declaration

Applications (which must be made online) would not be able to be completed without either disclosure or a declaration.

If the declaration or disclosure is false and it becomes known to the Commissioner of Patents before the patent is granted, the Commissioner would not progress the application unless the applicant provides the correct information.

If a false declaration is discovered after the patent or PVR is granted, they may be revoked (either by the Commissioner of Patents, or through legal challenge by a third party) or the scope of the right may be narrowed – if accurate information would have meant that it would not have been granted, or not granted in that form.

Under Scenario Three, the patent or PVR application will be refused or revoked if non-compliance with ABS requirements is discovered.

We assume in this analysis that all applicants would attempt to comply with any requirements.

3 What are the Impacts of These Potential Changes?

The potential impacts of the proposed DoO scenarios can be thought of in terms of direct and indirect effects. Direct impacts are changes in the costs and benefits of applying for patents or PVRs that impact the participants in the process directly. Indirect impacts are the subsequent effects that these direct effects cause on others, or in related markets.

3.1 What are the Potential Direct Effects?

We consider the direct cost categories of:

- Administration– the impacts associated with making and supporting the changes
- Compliance – the impacts of complying with the requirements of the changes.

The impacts also need to be distinguished between the initial costs associated with implementing the changes, and the impacts that will have continuing effects over the course of the assessment (30 years). Table 3.1 shows a summary of these potential direct effects.

Table 3.1: Direct Effects

Impact Type	Users	Potential Effects
Administration	IPONZ	<ul style="list-style-type: none"> ▪ Costs of implementation of changes ▪ Initial staff training on the additional requirements ▪ Development of internal guidance for new processing procedures ▪ Ongoing changes in the time taken to process applications ▪ Ongoing change in the number of patents to process
	PMAC ³	<ul style="list-style-type: none"> ▪ Ongoing change in the number of patents that PMAC reviews
Compliance	NZ Patent Applicants, e.g.; <ul style="list-style-type: none"> ▪ Researchers ▪ NZ small and medium-size enterprises (SMEs) ▪ Large NZ organisations 	<ul style="list-style-type: none"> ▪ Increase in the application and/or examination fee for filing a patent or PVR application ▪ Increase in the time taken to research the requirements of DoO ▪ Additional legal consultation required ▪ Costs associated with complying with other countries' ABS
	Foreign Patent Applicants, e.g.; <ul style="list-style-type: none"> ▪ China, Japan and the USA are the largest lodgers of patents internationally ▪ Top industries are electrical engineering and chemistry, which includes pharmaceuticals, food chemistry and biotechnology 	<ul style="list-style-type: none"> ▪ Increase in the application fee for filing a patent or PVR ▪ Increase in the time taken to research the requirements of DoO ▪ Additional legal consultation required ▪ Costs associated with complying with other countries' ABS

³ We have separated PMAC from IPONZ for the purpose of identifying effects, but PMAC is not a separate entity, it receives its funding from IPONZ

3.2 How Material are the Direct Effects?

We assess each of the categories identified in Table 3.1 to determine whether they are material and/or whether they should be progressed to the next stage of quantification. Impacts identified as medium or high will be progressed.

Materiality is determined by the relative impact that the change would make in the context of this analysis and compared to the other scenarios. At this stage of the analysis it does not reflect a monetary value. Impact combines the scale of the impact and the likelihood of it occurring.

Table 3.2 shows a summary of these assessments, and below, the reasoning behind these assessments is discussed.

Table 3.2: Materiality of Direct Impacts

Group	Impact	Scenario 1	Scenario 2	Scenario 3
IPONZ	Notifying of changes and updating collateral during implementation	Medium	Medium	Medium
	Additional staff training during implementation	Low	Low	Medium
	Development of internal guidance for new processing procedures	Medium	Medium	Medium
	Ongoing time taken to process applications	Low	Low	Medium
	Ongoing change in the number of patents and PVR applications to process	Negligible	Negligible	Low
PMAC	Time taken to assess additional patent applications	Low	Low	Low
NZ Patent and PVR Applicants	Additional time taken for research the requirements of DoO and ABS	Medium	Medium	High
	Additional need for legal consultation	Low	Low	Medium
	Costs associated with international ABS compliance	Negligible	Negligible	Medium
International Patent and PVR Applicants	Overall Compliance Costs (for reference purposes only, international costs not included in CBA)	Low	Low	High

What are the impacts that IPONZ could face?

Initial impacts to IPONZ are likely to revolve around the costs of implementation of the changes, which may require raising awareness, both domestically and internationally, of the additional requirements when submitting patent and PVR applications, and any changes to websites, forms, etc. These changes would be required for all Scenarios and are likely to have a **medium impact**.

We envisage that no substantial additional training for IPONZ staff would be required to process applications for Scenario One and Two, as it would simply involve some additional information being provided on the application form, and no significant change in the application process. Therefore, we consider this to be a **low impact**.

However, for Scenario Three, staff would need to significantly increase their knowledge of the ABS laws in place around the world and have an understanding of the conditions and evidence required to show that a patent or PVR applicant has complied with it. We assess this to be a **medium impact**.

Other impacts on IPONZ would include having to update all of the internal guidance material required for processing applications. This would include addressing questions such as the threshold for when it is acceptable for an applicant to declare that the CoO is unknown. This would be required across all scenarios and is considered a **medium impact**.

Regarding ongoing costs, for Scenario One and Two we assume that little additional time would be required to thoroughly assess that all the DoO information is exact and accurate, as it is predominantly an information gathering exercise. In some respects, having more information may make it easier to assess whether the patent is novel. For New Zealand GR and mātauranga Māori, IPONZ already asks whether inventions are derived from indigenous plants and animals and mātauranga Māori in its online application process, but disclosure is optional for patent applicants, so the new requirements could help to save time in the examination process. Therefore, we assess this to be a **low impact** for Scenario One and Two.

For Scenario Three, IPONZ may be responsible for assessing whether the proof of compliance with other countries' ABS conditions have been met and are valid. This is an entirely additional process to what is currently occurring and therefore, we assess that the additional time taken to process patents will be a **medium impact**.

There would be a direct effect on IPONZ if the DoO requirements resulted in a change in the number of patents or PVR applications that they would have to process. For Scenario One and Two we assume that the variation in patent and PVR applications because of the changes will be very minimal, and therefore will have a **negligible impact** on IPONZ.

For Scenario Three, a decrease in the number of patents and PVR applications submitted could occur due to an increase in the associated requirements and costs of submittal. Less applications to review could potentially free up time for IPONZ to conduct other activities. However, we believe that this would only have a **small impact**.

What would be the impact on PMAC?

The most likely impact on PMAC would be if they have to assess additional patent applications, as more people declare New Zealand as the CoO, or if they are given the requirement of also assessing PVRs. However, since there is already a process in place to have PMAC assess all patents lodged in New Zealand that may potentially contain New Zealand GR or Mātauranga Māori, having compulsory DoO should not affect this, or very minimally, and therefore would be a **low impact** for all Scenarios.

What would be the impact on New Zealand patent and PVR applicants under Scenario One and Two?

The additional DoO requirements may require extra time from people submitting applications to research and determine the CoO of the GR or TK involved in their patent or PVR. The time would vary significantly depending on the information already

available about that particular GR or TK and the standards that IPONZ set around showing that an adequate attempt to research CoO has been made, before an applicant can declare they do not know it.

Discussion in consultations have indicated that the number of patents that DoO requirements would affect is only a small proportion and would vary significantly depending on the industry (e.g. pharmaceutical vs. mechanical). All PVR applications have some form of GR and therefore would require some type of DoO. In addition, for the vast majority of patents and PVRs this information would already be known, as this is the kind of information that would generally be discovered whilst researching the product they wish to patent. For example, in order to know that their patent or PVR is novel, they would already have to know where it was from. Some scientists indicated that if the information was not already known, it could take a significant amount of time, effort, and research to determine. However, under Scenario One and Two, if determining the CoO for a certain GR was too difficult, the applicant would be able to make the honest declaration that the CoO could not be found.

The research time may be slightly higher for Scenario Two than Scenario One as the requirements are slightly greater, in needing to disclose the indigenous people or local community (IPLC) who supplied the TK, rather than just the CoO. To comply with Scenario Two, applicants would also need to provide the source if they did not know the CoO, however, this would presumably be already known, or easy to find for the majority of applications.

The financial costs of these requirements are likely to be relatively low on average, however, some may face high costs and therefore we rate them as a **medium impact**. This is made up of it being only a relatively small amount of extra time for the majority of applicants, but also the possibility of a significant impact on a small number of applicants.

What would be the time impact on New Zealand patent and PVR applicants under Scenario Three?

In comparison to Scenario One and Two, the time impact of having to comply with Scenario Three may be significantly greater as they are not being given the option of simply making a declaration that they do not know the CoO and they will also have to research whether the CoO has an ABS scheme and the requirements.

Finding ABS requirements generally involves contacting the country's Competent National Authority who should be able to provide all the information required on how to receive prior informed consent, and an internationally recognised certificate of compliance. The contact details and country summaries are all provided in an online database developed by the Convention on Biological Diversity (CBD) called the Access and Benefit-Sharing Clearing-House.⁴

For applicants with patents or PVRs that have New Zealand as the CoO there will be very little impact. However, for any patent or PVR applications that involve foreign GR or TK there will be the extra time involved in contacting the CoO to understand any ABS requirements.

Since DoO is not currently mandatory in New Zealand, data relating to the CoO of patents and PVRs applied for in New Zealand is not available, so we do not know what

⁴ <https://absch.cbd.int/countries/status/party>

percentage of patents this would apply to. However, because of the potential range we assess that the potential additional time requirements will be a **high impact**.

What would be the impact of compliance with ABS requirements under Scenario Three?

Country ABS requirements range from simple acknowledgement that they have been informed, to having discussions with the indigenous people, through to signing contracts that agree that when any product or process involving GR or TK from that country reaches the market for profit they will receive some benefit sharing of revenue (e.g. Brazil). Again, as we currently have very little information regarding CoO of current patents, it is difficult to know what percentage of New Zealand patents and PVRs are derived from foreign GR or TK or what countries’ ABS schemes patent applicants would most likely have to comply with. The likelihood of many New Zealand patents or PVRs facing stringent international ABS requirements is low, however because of the potentially high costs we assess this to be a **medium impact**.

What costs would foreign patent and PVR applicants face?

This economic assessment only includes the costs and benefits affecting the New Zealand economy, therefore, increased compliance costs for foreign companies applying are not included.

However, the compliance costs for international applicants are still important to consider, as they may have flow on effects to indirect costs and benefits in New Zealand.

Therefore, for the reasons stated above, we consider that having to declare the CoO under Scenario One and Two will have a **low impact**, and the additional research and proof of compliance with country ABS required under Scenario Three, will have a **high impact**. Some foreign companies may be very large, for example, multi-national pharmaceutical companies, and therefore, having to share even a small percentage of revenue with a CoO could be a significant cost to them.

3.3 What are the Potential Indirect Effects?

Indirect effects consider all other potential flow on effects from the changes to all areas of the New Zealand economy.

The nature of the role of patents and PVRs, both domestically and internationally, means that the proposed scenarios could have many flow on impacts that we identify in Table 3.3.

Table 3.3: Indirect Effects

Effect	Potential Impact
Change in the number of patents and PVR applications lodged in NZ ⁵	An increase in the cost of lodging a patent or PVR, or a decrease in the chance of it being approved, could discourage people from applying and lead to a decrease the number of applications lodged in NZ.
Impact on Research and Development activity	If the number of patents or PVRs being applied for decreases because they have become more difficult to

⁵ The change in the number of patents submitted is considered an indirect impact here because the changes themselves do not directly cause this to happen – it would only occur through the mechanism of a direct impact, such as an increase in cost or time.

Effect	Potential Impact
	obtain, this may result in individuals or firms not investing in the R&D required to discover new innovations as the expected return from R&D falls. This could have a further flow on affect to employment in R&D sectors.
Equitable and fair benefit sharing / improved international relations	NZ requiring compulsory DoO or compliance with other country's ABS, might encourage other countries to enter into reciprocal arrangements, and therefore allow NZ to develop and implement an ABS that other countries comply with.
Cultural Benefits to Māori	Compulsory DoO was a recommendation of the Waitangi Tribunal and achieving this will have a positive effect on Māori relationships. Additional DoO can ensure that all patents and PVRs lodged in NZ, and potentially overseas if other countries increase their DoO requirements as well, are granted with consultation of Māori to ensure that there is no misappropriation of New Zealand GR or mātauranga Māori, and no patents are in anyway contrary to Māori values.

3.4 How Material are the Indirect Effects?

We now assess the materiality of factors that may be indirectly affected by the implementation of these scenarios. A summary of these outcomes is shown in Table 3.4. We assess that for the majority of scenarios there is negligible impact from these changes, however, Scenario Three has some potential low impacts. Below we discuss how we arrived at these outcomes for each of the categories.

Table 3.4: Materiality Assessment of Indirect Impacts

Impact	Scenario 1	Scenario 2	Scenario 3
Impact on number of patents or PVRs submitted	Negligible	Negligible	Low
Impact on research and development	Negligible	Negligible	Negligible
Impact of equitable and fair international benefit sharing	Negligible	Negligible	Low
Cultural Benefits to Māori	Out of Scope - Unquantifiable		

3.4.1 What impacts will the changes have on the number of patents and PVRs sought in New Zealand?

A change in the number of patents or PVRs being submitted is not a cost or benefit in its own right. However, it can be an important indicator of, or factor affecting, research and development activity and is therefore important to consider.

The most likely reason for the number of applications to change because of the proposed scenarios, is because of changes in the associated cost or difficulty of applying (e.g. patent application fees themselves, or the time and effort related to applying).

Therefore, we need to investigate the potential impact that costs can have on patent and PVR application volumes. The literature has focussed more on the relationship between patents and costs, due to the greater number of applications internationally. We assume that the causal relationship is applicable to both kinds of applications as the demand drivers for applications are similar.

What is the impact of patent application costs on the demand for patents and PVRs?

A review of the literature related to this question provides mixed results. A 2003 study used data from the European Patent Office (EPO) from between 1991 and 2000 to model factors that contributed to a 70 percent growth in the number of patent applications over that period. They concluded that the large decrease in the cost of submitting patents was responsible for 40 percent of the overall increase in applications⁶.

However, a survey of German patentees during the same period reported that pressure to compete and co-operate, rather than decreased filing costs, had been the main drivers of increased patenting in Germany.⁷

A large study commissioned by the European Union's Directorate-General for Research and Innovation in 2014 used information from 40 European and International National Patent Offices (NPO) to analyse the impact of patent costs on the R&D and innovation activities of small and medium-size enterprises (SMEs), universities and Public Research Organisations. They were able to find no quantitative evidence that the enterprise investment on R&D was constrained or influenced by patent costs to a significant extent. This was despite the fact that a number of respondents to a survey they also conducted indicated that the costs of patents were a relevant factor.⁸

In 2012 de Rassenfosse and Van Pottelsberghe de la Potterie⁹ used a large dataset of patent fees since 1980 from Europe, the United States and Japan to develop an economic model to test for price elasticity (how responsive demand is to changes in price). The study found a significant relationship between patent cost and propensity to patent and concluded that the price elasticity of demand for patents is approximately -0.30.

This level of elasticity is relatively low and means that as the price for patents increases, the demand in patents falls by a comparatively smaller amount. This may be a result of a number of factors, including the fact that for larger firms (e.g. a pharmaceutical company), the application cost of patents is only a fraction of the cost in relation to their total R&D expenditure, or that application fees are significantly lower than the limit that many applicants would be willing to pay.

⁶ Eaton, J., Kortum, S., Lerner, & J. (2004). International Patenting and the European Patent Office: A Quantitative Assessment. *Patents, Innovation and Economic Performance: OECD Conference Proceedings*, 27-52.

⁷ Elder, J. (2003) Scope and Nature of the Patent Surge: A View from Germany. *Patents, Innovation and Economic Performance OECD Conference Proceedings*

⁸ European Commission (2015) Patent costs and impact on innovation - International comparison and analysis of the impact on the exploitation of R&D results by SMEs, Universities and Public Research Organisations

⁹ de Rassenfosse, G., & Van Pottelsberghe de la Potterie, B. On the Price Elasticity of Demand for Patents. *Oxford Bulletin of Economics and Statistics*, 74(1), 0305-9049.

Based on this research we can conclude that implementing Scenario One and Two will have a **negligible impact** on the volume of patent applications, because the associated change in costs is already presumed to be small. For Scenario Three where we have assessed that there will be a moderate effect on costs we assess there will be a **small impact** on patent application volumes (i.e. a moderate cost impact combined with a low-price elasticity means a comparatively smaller impact on demand). Another factor that may minimise the effect, is that the most significant costs related to Scenario Three, such as complying with other countries' ABS schemes, are likely to occur after the patent has already been lodged and is proving to be commercially successful. This may not prove to have such an effect on people's decision whether to lodge the patent in the first place.

3.4.2 What is the relationship between applications and research and development?¹⁰

The nature of the relationship between patents and R&D is a question that builds on the previous question around the effect that price can have on patent applications. If the volume of patent applications can be influenced by price, then can this in-turn have an impact on R&D and innovation?

The relationship between patents and R&D has been a topic of international research for many years, yet there are mixed/inconclusive findings

The purpose of patents is to grant a monopoly right to the applicant for a novel idea for a given amount of time to encourage innovation and investment in research and development. The pharmaceutical industry is an example where the importance of patents in encouraging research and development has generally been proven, due to the high lead times, significant costs and failure rates. However, the benefits to some other industries, such as mechanical, is less clear. Some have even argued that an increase in patents can lead to a reduction in the diffusion of knowledge and therefore innovation¹¹, or that reducing the accessibility of the patent scheme can have a positive effect on R&D by discouraging low quality patents.¹²

There have been many studies that have found positive correlations between patent application numbers and R&D investment¹³, however, determining the causality or direction of the relationship is far more challenging.

Some research has suggested that the relationship between accessibility of patents and innovation is not causal, but simply a reflection of the innovation that is already occurring¹⁴.

¹⁰ The definition of R&D, or innovation, from Statistics NZ is: "The introduction or development of any new or significantly improved goods, services (products), processes, or methods encompassing a complex range of activities. Comprises original, creative, investigative work systematically conducted to increase knowledge"

¹¹ OECD (2004) Patents and Innovation: Trends and Policy Challenges; Organisation for Economic Co-Operation and Development

¹² de Rassenfosse, G; Jaffe, D (2015). Are Patent Fees Effective at Weeding Out Low-Quality Patents? *Motu Economic and Public Policy Research*

¹³ Park, W., & Ginarte, J. (1997). Intellectual Property and Economic Growth. *Contemporary Economic Policy*, 15(3), 51-61; Kanwar, S., & Evenson, R. (2003). Does Intellectual Property Protection Spur Technological Change? *Oxford Economic*, 55(2), 235-264.

¹⁴ Jaffe, A. (2000). The U.S. Patent System in Transition: Policy and the Innovation Process. *Research Policy*, 29(4), 531-557; Baldwin, J., Hanel, P., & Sabourin, D. (2000). Determinants of Innovative Activity in Canadian Manufacturing Firms: The Role of Intellectual Property Rights. *Statistics Canada Working Paper No.122*.

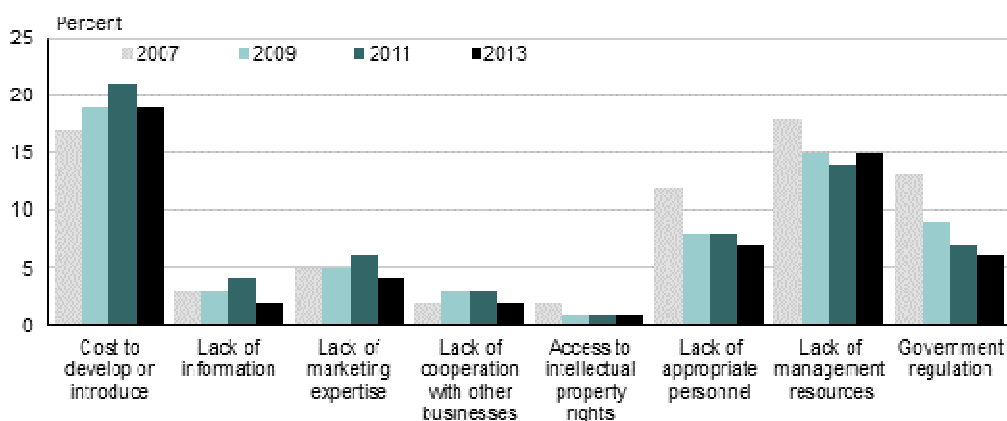
A study of Japanese firms investigated patent reforms that had occurred in Japan in the late 1980s that significantly increased patent rights but found that this had little to no impact on R&D investment or innovation¹⁵. Another study by Lerner in 2009 used data from 60 countries over 150 years and analysed the most significant changes in patent rights that had occurred. He found no evidence that increased patent protection had a positive impact on innovation.¹⁶

There are several reasons why it may be hard to find a relationship between availability of patents and R&D. First, determining an accurate and reflective measure of R&D is challenging, and can differ significantly across studies. Second, R&D is influenced by a range of factors, such as education, funding, tax, government regulation and policies, of which patenting is only one. Therefore, this makes any relationship particularly challenging to isolate and difficult to draw any confident conclusions about causality.

How does the international literature on patents and R&D relate to the New Zealand context?

There has been little significant research of this type conducted with New Zealand patent data. However, as can be seen in Figure 3.1, the lack of access to Intellectual Property rights was considered only a very small barrier to hampering innovation in New Zealand.

Figure 3.1: Barriers that Hamper Innovation



Source: Statistics New Zealand

R&D is not a particularly large sector in New Zealand relative to other Organisation for Economic Co-operation and Development (OECD) countries of a similar size¹⁷ and R&D spending remains small despite a high performing patent system internationally.

This supports the idea that the bottleneck for innovative growth in New Zealand is not the patenting process itself, but other factors that influence R&D, such as a lack of scientific infrastructure, types of industry, tax incentives, the presence of small firms, or the commercialisation of existing patents with New Zealand’s small market size and potential lack of business competition.

¹⁵ Sakakibara, M., & Branstetter, L. (2001). Do Stronger Patents Induce More Innovation? *Rand Journal of Economics*, 32, 77-100.

¹⁶ Lerner, J. (2009). The Empirical Impact of Intellectual Property Rights on Innovation Puzzles and Clues. *American Economic Review*, 99(2), 343-348.

¹⁷ archive.stats.govt.nz/browse_for_stats/businesses/research_and_development/ResearchandDevelopment_Survey (2012)

Another factor to consider is that if a foreign patent is not filed in New Zealand, there would be free access for anyone in New Zealand to copy and distribute the invention, which could arguably make the technology cheaper and more accessible.

Based on this review of the research and the lack of any conclusive evidence around the casual relationship between patents and R&D, we assess that there will be a **negligible impact** on R&D in New Zealand as a result of the implementation of any of the proposed Scenarios.

Figure 3.2 shows a visual representation of the logical steps behind this conclusion.

Figure 3.2: Impact of Scenarios on R&D in NZ

3.4.3 What are the indirect impacts from fair and equitable international benefit sharing?

For Scenario One and Two; requiring the DoO on the patent or PVR application form will not result in any material changes to equitable and fair benefit sharing. The system in place currently is equally likely to lead to support these arrangements in New Zealand. Therefore, they have a **negligible impact**.

For Scenario Three, benefits to New Zealand from an increase in reciprocal arrangements are unlikely to occur as a result of this change alone

Scenario Three will have indirect benefits relating to fair and equitable benefit sharing if this change alone causes other countries to increase reciprocal arrangements for benefit sharing.

The potential effects of this will be limited because:

- Other changes would be needed in addition to this change to cause the benefit
- The number of patents or PVRs being lodged overseas using GR or TK from New Zealand is likely to be small
- There are few examples of compliance with ABS schemes internationally.

Other changes would be needed in addition to this change to cause the benefit

If Scenario Three was implemented this may increase the likelihood that New Zealand would sign and ratify the Nagoya Protocol. This would involve creating an ABS that has clear rules and procedures for prior informed consent and specified benefit-sharing obligations and could increase the chances that benefit sharing would occur with other countries involved.

However, this could not be attributed solely to Scenario Three as this is only a possible contributing factor, and New Zealand could sign the Nagoya Protocol with or without implementing the DoO requirements.

The number of patents or PVRs being lodged overseas using GR or TK from New Zealand is likely to be small

There is little information available about how many patents are being lodged overseas that would make use of New Zealand GR. The vast majority of Earth's species originate from 17 megadiverse countries; Australia, Brazil, China, Colombia, Democratic Republic of the Congo, Ecuador, India, Indonesia, Madagascar, Malaysia, Mexico, Papua New Guinea, Peru, Philippines, South Africa, United States, and Venezuela. Therefore, New Zealand is likely to under contribute relative to these sources.

It is also difficult to know how many international patents would make use of Māori TK, but again, it is likely to be small.

There are few examples of compliance with ABS schemes internationally

Since the Nagoya Protocol was adopted in 2010, the examples of equitable and fair benefit sharing on mutually agreed terms occurring between other countries has been limited. Only a small minority of parties to the Nagoya protocol have been able to put in place the appropriate legislation required to make patent applications comply with international ABS schemes.

A 2017 study investigating 96 countries (79 state parties to the Nagoya Protocol and 17 States parties to the Convention on Biodiversity) found that between 1996 and 2015 only 217 commercial ABS agreements have been concluded¹⁸. This equalled an average of only 2.05 ABS agreements per year for the 14 countries with ABS legislation in force.

Any benefits occurring from equitable and fair benefit sharing schemes can only be included in this analysis if they are variations from what would occur in the counterfactual scenario. That is, if any countries that are already requiring compliance with international ABS schemes, or were already planning to start requiring it, this benefit could not be accrued to the changes.

Therefore, we assess this to be a **low impact** for Scenario Three.

4 What are the Quantitative Costs of the Material Impacts?

In this section we describe the value for each material cost and benefit (impacts deemed medium or high) and how we calculated it.

¹⁸ Access and Benefit Sharing under the Convention on Biological Diversity and its Protocol: What Can Some Numbers Tell Us about the Effectiveness of the Regulatory Regime?; Nicolas Pauchard; Resources 2017

4.1 What are the Administrative Costs to IPONZ?

The material administrative costs of the proposed changes all fall to IPONZ. This includes implementation and ongoing costs. We identified four material costs:

- Implementing the changes
- Updating internal guidance procedures
- Additional staff training
- Additional time to process applications.

The period of analysis for this economic evaluation is 30 years as per Treasury’s guidelines. Some costs occur only in some years (such as implementation costs) and others occur across the entire period (such as compliance costs). All costs are discounted back to present values, from the year in which they occur, using the appropriate discount rate.

The results of our estimation are shown in Table 4.1:

Table 4.1: Administrative Cost Estimation Over 30 Years (PV)

Cost Type	Scenario 1	Scenario 2	Scenario 3
Implementation Costs			
IPONZ Implementation	\$400,000	\$400,000	\$400,000
Updating internal guidance procedures	\$100,000	\$100,000	\$100,000
IPONZ Additional Training Requirements	Nil	Nil	\$90,000
Ongoing Costs Over 30 Years			
IPONZ additional application process time	Nil	Nil	\$3,589,000 (\$2,364,000 for patents + \$1,225,000 for PVRs)
TOTAL PV	\$500,000	\$500,000	\$4,179,000

IPONZ will face costs to implement the changes

The costs associated with implementing the changes will involve informing all relevant parties of the amendments, both domestically and internationally, and making changes such as updating the website and application forms. Support will then be required, for example answering queries, for applicants over the initial period.

We assume that this cost will be the same across each of the Scenarios and use a combined estimated cost of \$400,000 to cover all of these initial amendments. This estimate is based on other changes of a similar magnitude in other industries, however, IPONZ could spend more or less than this depending on how they actually approach the task.

IPONZ will have to update all internal guidance material

The internal guidance material, such as determining the thresholds required for assessing whether an applicant has made a sufficient effort to discover the CoO, will need to be updated for all scenarios. We assume a cost of \$100,000 for all scenarios.

Additional staff training will be required

Additional IPONZ staff training costs will only apply to Scenario Three, as the only significant training that will need to take place will be relating to building up knowledge about other country ABS schemes, and the required evidence to prove compliance.

To estimate this cost, we have used the number of IPONZ application assessment staff¹⁹ and an assumption that they will all need a week of additional training/development.

To estimate an IPONZ staff salary we use an average government analyst salary of \$60,782.²⁰

Additional time will be taken to process applications

We have determined that this will only be a material cost for Scenario Three, relating to the ABS requirements.

We assess that having to confirm that the ABS requirements have been identified and complied with will take an average of 4 hours per patent or PVR application. This will apply to both domestic and foreign applications. In terms of the percentage of patents and PVRs that will be required to provide evidence that they have complied with the CoO's ABS scheme we use an assess 20 percent for patents and 80 percent for PVRs. These assumptions will be tested in the sensitivity analysis.

The number of patent applications submitted in New Zealand in 2017 was 5,979 in total. Since 2010 the number of patent applications submitted in New Zealand declined by an average of one percent a year. In 2016 there was a growth rate of 7.8 percent in patent applications worldwide. However, China accounted for 84 percent of this total growth and if they are excluded, total international growth was 1.9 percent.^{21 22}

For the purpose of this assessment, it is not an appropriate method to assume that patent applications will continue to decline, so we use the average of the New Zealand and international growth rates of 1.5 percent, as the annual growth rate in patent applications in New Zealand over the next 30 years. This is tested in the sensitivity analysis.

The number of PVR applications in 2017 was 135. There has been an increase in PVR applications in New Zealand over the last 10 years, at an average of five percent, which we use as the growth rate over the next 30 years.

It is possible that IPONZ would pass the additional time taken along in the form of increasing application fees. However, for the purpose of a CBA transfers are ignored.

4.2 What are the Compliance Costs to New Zealand Patent and PVR Applicants?

The material compliance costs of the proposed changes all fall to patent and PVR applicants. This includes time to submit applications, legal fees and compliance costs with ABS schemes.²³ The results of our estimation are shown in Table 4.2.

¹⁹ Number of staff based on information of IPONZ personnel costs.

²⁰ www.payscale.com

²¹ World Intellectual Property Indicators, WIPO, 2016

²² <https://www.prnewswire.com/news-releases/european-patent-office-annual-report-2017-patent-applications-from-the-uk-keep-growing-676084003.html>

²³ The calculations were based on the estimated application volumes over 30 years:

- Patent applications: 214,946 international, 14,527 domestic
- PVR applications: 5,714 international, 2,990 domestic.

Table 4.2: Compliance Cost Estimation Over 30 Years (PV)

Cost Type	Scenario 1	Scenario 2	Scenario 3
Ongoing Costs Over 30 Years			
NZ Applicants Additional Time to Submit	\$276,000 (\$162,000 for patents + \$114,000 for PVR)	\$345,000 (\$203,000 for patents + \$142,000 for PVRs)	\$1,219,000 (\$649,000 for patents + \$570,000 for PVRs)
NZ Applicants Additional Legal	\$614,000 (\$360,000 for patents + \$253,000 for PVR)	\$614,000 (\$360,000 for patents + \$253,000 for PVR)	\$1,227,000 (\$721,000 for patents + \$506,000 for PVR)
NZ Applicants Compliance with International ABS	Nil	Nil	\$839,000
TOTAL PV	\$890,000	\$959,000	\$3,285,000

Additional time will be taken to submit an application

We consider how much extra time may be required by New Zealand applicants (additional time costs for international applications not included in assessment) to complete patent or PVR applications if each of the DoO scenarios were to be implemented.

Scenario One involves the additional time that must be taken to attempt to find the country of origin of GR or TK, or if unknown to make an official declaration. Times may vary significantly, as some will already know, and others may have to undertake additional research. We use the average of an additional 4 hours for 20 percent of patent applications and 80 percent of PVR applications. These proportions are tested in sensitivity analysis.

For Scenario Two, a small amount of additional time may be taken as they need to be more specific about the TK and try to list the IPLC who supplied the TK, not just the CoO. For this we will use an average of 5 hours.

Scenario Three could require the significant extra time of having to go through the process of contacting the CoO regarding the ABS, waiting for feedback and potentially having to provide more details, or have extensive discussions relating to receiving informed consent. This process could take place over several weeks, but we use and average combined time of 2 work days, or 16 hours.

To assess an hourly rate for applications we use the median cost of a New Zealand scientist is \$65,872²⁴, which equates to an hourly rate of \$32.94. We note that this is a gross average of junior and senior staff.

The number of patents submitted in New Zealand by domestic applicants in 2017 was 380 (only seven percent of total), and the number of PVR applications submitted by New Zealand applications was approximately 45 (31 percent of total).

²⁴ www.payscale.com/research/NZ

There will be additional legal fees associated with the changes

Due to the additional legal conditions required to complete a patent application, we assume more New Zealand applicants will require additional legal assistance when submitting an application. We base this on an average of an additional hour for Scenario One and Two and an additional 2 hours for Scenario Three at the average hourly rate for a New Zealand lawyer in 2016 of \$292.70²⁵

Compliance with ABS schemes will incur additional cost

Predicting the costs of complying with international ABS schemes is highly uncertain, because:

- We currently have no information relating to the CoO of GR and TK in New Zealand applications
- The amount that may have to be shared in an international ABS scheme may be entirely dependent on the profit that the patented item goes on to produce
- We don't know how many additional schemes will be set up in the next 30 years, if any.

However, for this analysis we make some assumptions. First, that five percent of New Zealand applications would be based on GR or TK from a country outside of New Zealand that has an ABS scheme in place that involves sharing of revenue. Second, the average cost of complying with an international ABS scheme would vary largely but has an average of \$8,000 ²⁶ (we vary this in our sensitivity analysis to test the effect on the overall PV cost).

Table 4.3 provides a summary of the present value of the estimated costs.

Table 4.3: Direct Cost Estimations

Cost Type	Scenario 1	Scenario 2	Scenario 3
Administrative Costs	\$500,000	\$500,000	\$4,179,000
Compliance Costs	\$890,000	\$959,000	\$3,285,000
Total PV	\$1,390,000	\$1,459,000	\$7,464,000

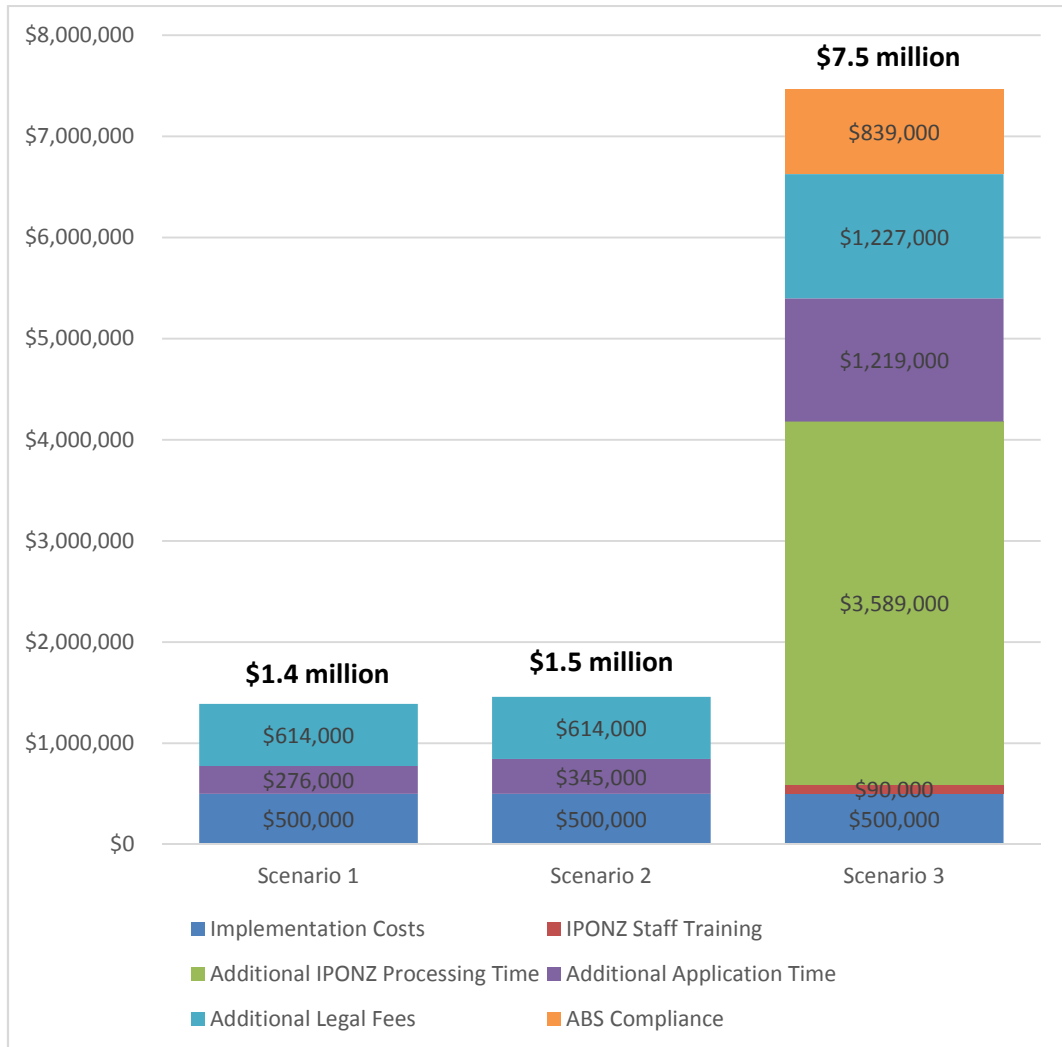
²⁵ <http://www.lawsociety.org.nz/lawtalk/lawtalk-archives/issue-893/charge-out-rates-information-released>

²⁶ Taken from an assumption in an Australian Study on the Economic Impact of GR Disclosure Requirement in the Australian Patent System, Concept Economics, 2009

4.3 What is the Net Effect of Disclosure of Origin Requirements?

Direct impacts of the potential DoO Scenarios are only represented by costs, with no material benefits that can be quantified. This is illustrated in Figure 4.1 below.

Figure 4.1: Breakdown of PV Costs for DoO Scenario Options



Scenario Three has significantly greater costs, which is predominantly due to the additional application processing time, the time that will be required to research the ABS requirements of the CoO for the GR and TK and the extra cost that could be associated with complying with these ABS, such as potential ongoing sharing of benefits, which would flow out of the country.

4.4 What Happens When We Vary Key Assumptions?

This assessment has uncertainty associated with the key assumptions that drive the outcomes. To show how dependent these results are on some of these assumptions we vary them and assess the range of outcomes that result. We focus on variables where there is high uncertainty over what will actually happen as a result of the proposed changes.

We can already see the effect of varying the additional time taken to submit a patent application by looking across the three scenarios. Scenario One was based on an additional 4 hours to submit an application, which resulted in a PV of \$276,000, compared to 16 hours for Scenario Three, which results in an PV of \$1,390,000. Therefore, we can see that this has a significant effect, while recognising that both numbers are low (by regulatory change standards).

Other key variables to test are:

- The discount rate
- The annual growth rate of patent and PVR applications
- Percentage of patents and PVR that DoO requirements would apply to
- Amount of legal consultation time incurred per application
- ABS compliance costs
- Percentage of applicants who have to comply with an ABS (captures the number of ABS and the nature of patents).

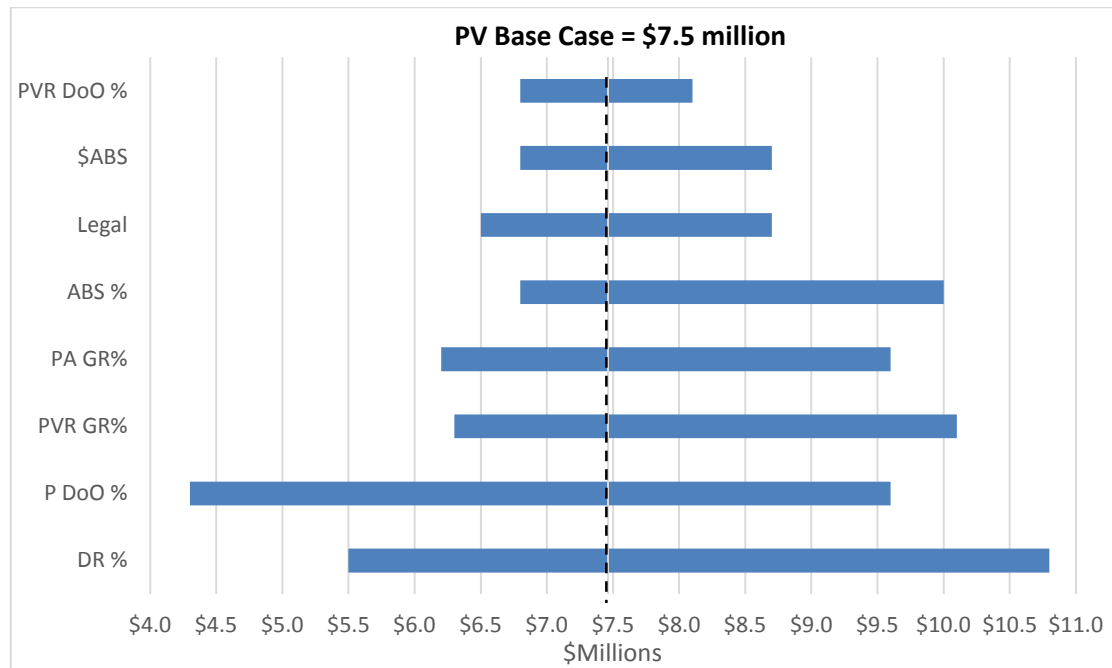
Table 4.4 below shows the impact of varying these assumptions within a reasonable range:

Table 4.4: Sensitivity Test Results

Model Variable	Abbreviation	Sensitivity Range	Scenario One (\$m)	Scenario Two (\$m)	Scenario Three (\$m)
Discount Rate	DR %	3-9 percent	1.8 – 1.1	1.9-1.2	10.8-5.5
Patent Application Annual Growth Rate	PA GR%	-2 – 5 percent	1.2 – 1.6	1.3 – 1.7	6.2 – 9.6
PVR Annual Growth Rate	PVR GR%	0 – 10 percent	1.2 – 1.8	1.3 – 1.9	6.3 – 10.1
Percentage of Patents Affected by DoO Requirements	P DoO %	5 – 30 percent	1.0 – 1.6	1.0 – 1.7	4.3 – 9.6
Percentage of PVR Applications Affected by DoO Requirements	PVR DoO %	60- 100 percent	1.3 – 1.5	1.4 – 1.6	6.8 – 8.1
Legal Hour per Application	Legal	0.5 – 4 hours	1.1 – 3.2	1.2 – 3.3	6.5 – 8.7
ABS Compliance Costs	\$ABS	\$1,000 - \$20,000	No Effect	No Effect	6.7 – 8.7
Percent of Applicants Having to Comply with ABS	ABS %	1 – 20 percent	No Effect	No Effect	6.8 – 10.0

Figure 4.2 below illustrates the sensitivity variations for Scenario Three that had the largest impacts. For example, by varying the percentage of New Zealand applications that would have to comply with an international ABS (as this is one of the variables that we have the least information regarding) between one and 20 percent, the overall value of the Scenario Three PV costs, would vary by \$3.2 million. Although this is an extreme range for the ABS variable, it is important to be aware of the significant effect that it could have, and the lack of information that we have to input into the PV analysis.

Figure 4.2: Variation Caused by Different Variables on Scenario Three



4.5 How do Intangible Effects Impact the Analysis?

The outcome of this CBA shows that there is a small administrative cost for the first scenario of change ranging to a more significant, but still relatively small, cost for Scenario three.

The cost is small, when considered against the PV of a regulatory change impacting over a long period, and the uncertainty surrounding this study.

Other factors to consider in the balance of costs and benefits are the intangible benefits that need to be traded off against the direct costs. These have been identified as:

- An increase in the volume and quality of information regarding the use of GR and TK in New Zealand patent and PVR applications
- Compliance with Treaty of Waitangi considerations
- A clearer international position on the issue of the use of other countries' GR and TK that could potentially lead to value to New Zealand through reciprocal international relationships.

If the value of these benefits were considered greater than the direct costs identified in this study, then the proposals would be beneficial.



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