

Innovation Case Study:

The Smart Hook System

1. The innovation

The Smart Hook, designed by Hans Jusseit, is a revolutionary fishing hook which makes long-line fishing safer for seabirds and turtles. Hans' design is a covered hook that lets the baited hook catch fish, but not seabirds or turtles. It functions by attaching a barrier over the baited hook, held in place by an alloy pin that dissolves in a short period of time, releasing the barrier once the hook is well below 100 metres, which is deeper than seabirds can dive and below the usual feeding depth of turtles. The Smart Hook makes it impossible for anything to be hooked from the time the line is deployed until it reaches the depth where the tuna are swimming. Not only does the shield protect sea animals, but it also acts as a sinker for the baited hook, as the bait falls in line with the shield and it sinks directly.

Evidence suggests that over half a million seabirds and turtles are being killed every year, to the extent of endangering some species, due to tuna long-liners. Because of the high kill rate of these animals each year, fisherman, Hans Jusseit realised the need to prevent the capture of seabirds and turtles while a long-line is being set, and came up with the solution of the Smart Hook System.

The Smart Hook is a circular, disk shape, made from mild steel. The steel is untreated, allowing it to rust easily, hence the aesthetics of the design is directly related to the function.

2. Historical development and the design processes employed

Hans Jusseit is a retired fisherman, master mariner, commercial diver and retired CEO of the East Coast Tuna Industry. He was a tuna fishing boat operator for ten years and in this time Jusseit learnt how serious the impact of long-line fishing was and the magnitude of the problem from his involvement as a representative and advocate of the tuna industry. Upon realising the impact that long-line fishing was having on the sea creatures, Jusseit decided that he wanted to be a part of the solution rather than part of the problem.

Jusseit's design evolved over numerous months. After attending a number of workshops, of which other people with the same concerns as Jusseit were a part of, he provided input and came up with the initial idea to increase the size of the fishing hook. That way the seabirds and turtles would not be able to swallow the hook, as it would be too large to get into their gullet, the place where a lot of the animals often get hooked. This idea was quickly dismissed by Jusseit, as it was thought that it wasn't taking the idea far enough. After several months of developing design sketches and playing around with and manipulating wires, the final idea came about. Jusseit was pursuing a hobby of

his, wiring up bonsai trees when after playing around with the wire and a hook, he came up with the idea of making a shield or a cage around the hook to stop it from being swallowed, and stop the hook from hooking the animal.

After further development of the design, the prototype was produced. Objectives were then set out by the research team of, principle investigator, Hans Jusseit, Barry Baker and Kerstin Fritches, addressing three project objectives:

Observe, document and record seabird behavioural responses to the Smart Hook and its effectiveness.

Observe, document and record turtle behavioural responses to the Smart Hook and its effectiveness.

Determine operational performance of the Smart Hook System in a commercial fishing operation.

Adhering to these objectives the prototype was tested on seabirds in the South Island of New Zealand, which allowed good access to a full range of birds. Throughout the entire length of the trials not one seabird was hooked, including the endangered Wandering and Royal Albatrosses and Giant Petrels which were not able to ingest or become hooked on the smart hook, as the shield prevented them from doing so. Not only were the birds unable to get hooked, but the shield also prevented them from catching the bait or getting a hold of it. Following these trials, tests on sea turtles were carried out in Australia on the Sunshine Coast. These tests turned out to be successful, yielding the same results, confirming the ability of the smart hook to prevent the capture of both sea turtles and sea birds. Following this the research team travelled to the USA to a turtle research facility in Galveston, where they tried several different species of turtles. In particular it was the loggerhead turtles which were more closely tested, as they are primarily what gets hooked in the Atlantic and the eastern Pacific Ocean.

These trials were very successful, as they gave the government confidence that the innovation was something that really worked.

Throughout the design process, Hans visited South America and New Zealand where he spoke with fishing fleet operators, to gain feedback on their thoughts of the design. This was very positive, as some requested that they get the system as soon as it became commercially available.

3. Extent of creativity employed by the designer

Originally the idea was put forward to increase the size of the fishing hook, that way the marine wildlife would not be able to swallow the hook, as it would be too large. This thought quickly evolved into the existing innovation, as it was thought that the aforementioned idea was not taking the design far enough. Hence Jusseit, was creative in his thinking, in that he wanted to create a barrier like shield to completely protect the animals in danger, rather than simply increasing the size of the hook, whereby there is still risk an animal could be injured.

4. Marketing strategies, timing, political and economic factors that have impacted on the success of the innovation

The success of The Smart Hook innovation is influenced strongly by a marketing strategy that is heavily environmentally and politically based. The timing of this product is perfect, in the sense that it offers a 'Green' solution to the decimation of marine bird life and turtles associated with the effects of long line fishing. Western Governments in particular are generally supportive of commercial activities that offer a 'Green' alternative to current practices that have a negative influence on the environment. This influence is generally brought about throughout the process of lobbying politicians and their departments on the positive aspects of the innovation. The Smart Hook System target market is predominantly fisheries located in first world countries as they generally have the financial means and social conscience in a political sense to support the product. Hence the environmental bodies within Australia, New Zealand and the USA have been supportive in the research and the research findings of the studies to date.

The Smart Hook System appeared and was comprehensively endorsed on the ABC program- 'The New Inventors' in 2008. It won the weekly segment of the program according to the judges and also won the 'peoples choice award'. This was an important public relations exercise in bringing the product to light with such profound credibility. Since this time the innovator, Hans Jusseit as director of the company Ahi Enterprises Pty Ltd, that owns the design has been negotiating with various manufacturers so that it can be released to market at a price that is affordable and hopes to achieve this by July 2009.

Ahi Enterprises Pty Ltd have been using both direct and indirect forms of marketing preceding the release of the product to market. Specifically this has taken the form of promotion through word-of-mouth within the industry. Because the fishing industry is confined there is considerable interest in the upcoming release of the product. The innovation is also being marketed via the internet and there is a planned release of print media advertising in magazines. By slowly releasing information through various media it has been a smart way to maintain interest, not just with Government agencies such as fisheries and National Parks and Wildlife but also with end users such as fishing fleet operators.

Ahi Enterprises Pty Ltd have been working on the economic side of the product with manufacturers in bringing the product to market at an affordable price that will still be cost effective for fishing operators to implement. Hans Jusseit has been in discussions with manufacturers some of which supply to the automotive and building industry. These manufacturers see this as an opportunity to diversify their business operations in aligning themselves with this product innovation amongst whom there has been wide interest in producing the product.

From a global economic perspective it is unfortunate that many countries including those already mentioned that have shown interest in the product namely Australia, New Zealand and the USA have fallen into recession or in Australia's case on the cusp of a recession. This may impact on uptake of the product once it is released to

the market due to fishing businesses rationalising costs in order to remain viable.

The range and use of technologies in the development of the innovation

Throughout the development of The Smart Hook, innovator, Hans Jusseit employed a range of differing technologies. He and his design team commissioned Dr Jeffery Will, a specialist in metallurgy, of the Queensland University of Technology to help find the exact blend of alloy to use for the dissolving pin and the protective shield. This was an extensive procedure, as the pin needed to be strong enough to support the weight of the metal shield, but reactive enough to corrode quickly in sea water, without corroding in air. The designer also needed to make sure that it would leave no toxic residue after it had dissolved. Therefore technology was employed and the result was that the shield and pin were both created from metal alloy which dissolves leaving no contaminants.

In addition to this, the design team have also created an emerging technology which allows the shield to be attached to the hook with the pin, semi-automatically. The applicator works where the fisherman baits the hook and pushes it into the dispenser, where the shield is attached to the hook with the pin. The use of this dispenser makes the application of the shield very rapid, as it takes less than ten seconds between hooks. It serves a great purpose, as it is a very time consuming procedure, to apply the shield by hand when there are thousands of hooks to be prepared. Thus the emerging technology has provided a much more effective and efficient way of using the Smart Hook innovation.

6. The role of government, commercial, industrial or other agencies that have contributed to the success of the innovation.

The Smart Hook System has been supported by numerous government agencies including Ausindustry, from which a \$120 000 Commercialising Emerging Technologies (COMET) grant was received. This contributed in turning the working prototype into a product ready for full scale manufacture. Austrade has also aided Ahi Enterprises Pty Ltd in the promotion and preparation for release to foreign markets.

The ABC (The New Inventors program) which is Government owned played a vital role towards the credibility of The Smart Hook, as this was the first that the innovation was brought to the attention of the general public. This attention on the national stage can be an important driver in lobbyists trying to influence Government agencies such as fisheries in mandatory uptake of the product where tuna long-line fishing is concerned.

Hans Jusseit engaged the services of metallurgist, Dr Jeffery Will from the Queensland University of Technology to help develop the correct blend of alloy for the finished product.

The Smart Hook System project has had the help of commercial enterprises through prototype trials in Australia, New Zealand and the USA. Ahi Enterprises Pty

Ltd were able to access research testing facilities in Galveston, USA where trials were conducted with sea turtles. In using this facility they were able to trial the product on several species of turtles. It was found during the trials that the product would need to be universal so as to suit turtle species that inhabit the Atlantic and Eastern Pacific oceans. This of course was vital economically so that it opened the suitability of the product to a wider market as far as sea turtles were concerned.

7. Entrepreneurial activities that have contributed to the success of the innovation.

Entrepreneurial activities essentially encompass the period from post conception of the innovation right through to release of the product to the market. Hans Jusseit has had to draw on the expertise of people in order to bring the innovation to its present stage which is now just short of pre market release by a matter of months.

Hans Jusseit spoke at conferences and seminars involving fishing fleet operators around the globe, and in doing so explained the innovation in detail, to the broader target market. The immediate feedback was very positive and in fact leaders in the fishing industry “were putting their hands up saying they want it on their boats”. Some of these entrepreneurial activities have already been explained and accounted for in the previous responses. A summary of which are:-

- Organising promotion through The New Inventors program
- Austrade assistance
- Ausindustry COMET program
- Testing of prototypes in Australia and overseas. This would have involved entrepreneurial skills simply from the point of view of logistics.

8. Ethical issues considered by the innovator

Having worked in long-line tuna fishing for a number of years and knowing its negative effects on the environment Hans Jusseit was determined to find a better solution in resolving its harmful effects on turtles and birdlife. Hence The Smart Hook innovation was born out of a strong ethical desire to care for marine seabirds and turtles. When designing the innovation Hans Jusseit took into consideration the effect that the system would have on the marine environment. He considered the type of material the product would be made out of, to ensure it would not be harmful to marine life in any way, leaving no toxic residue. The components of his product are also biodegradable which ensures a ‘Green’ solution to this problem.

9. The environmental issues that have impacted on the design and the degree of its success

Specifically the environment has a huge impact on the Smart Hook, and the degree of its success. Hans Jusseit had to consider the effect his innovation would have on the environment, as he did not want the discarded shield (once it has dripped off the hook) to cause any pollution to the ocean. Thus, considering the environment, had an impact on Jusseit's work, as he needed to produce The Smart Hook from a suitable material that would not affect the ocean in any way.

The marine environment plays a major role in the effectiveness of this innovation, as it destroys the shield once it falls off the hook and sinks to the bottom of the ocean. The shield is made from mild steel and is not treated in any way, shape or form. This allows the shield to rust very quickly, once it falls off and drops to the bottom of the ocean. Once in the ocean, the salt water reacts with the steel, causing it to rust and eventually dissolve. This breakdown can take from anywhere between six to twelve months. After the shield has rusted it leaves nothing behind but iron and carbon, therefore not causing pollution to the ocean in any way. Thus the considerations of the environment had an impact on the work of Jusseit, as he needed to make sure that his innovation was 'environmentally-friendly.' The environmental considerations also impacted on the degree of success of the design, as The Smart Hook would not be considered successful if it sat on the bottom of the ocean without breaking down, as it would create pollution and it would be left for an extended period of time, possibly being hazard to marine wildlife.

10. Contribution to the quality of life of Australian society

Hans Jusseit as director of Ahi Enterprises Pty Ltd is working to ensure that the Smart Hook System is manufactured in Australia. This will bring economic benefits to stakeholders involved directly in its manufacture and because of this it will also add value in terms of it being distributed from Australia to export markets. This also benefits Australian's indirectly as it ensures that business profits and wages stay within Australia.

The Smart Hook System is designed to help marine ecosystems. This ultimately will have a tangible effect on bird and marine life and in turn will contribute in a less tangible way to the benefit of Australian society as it will help in keeping balance with the ecology of marine and bird life and other ecosystems as a flow on effect.

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