

A report on

Introduction to Innovation Management- Assessment B

University of Wales Trinity Saint David
(MADE Project)



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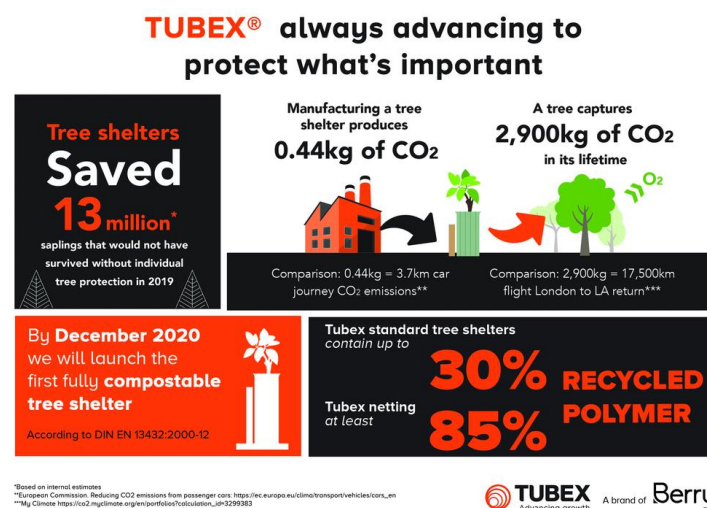
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Introduction

In 1978 the first treeshelters were conceived and trailed by Graham Tuley of the UK Forestry Commission. Since then, Tubex have been researching and refining the range to offer increased benefits and establishment safeguards as identified through many trials. Once production was scaled up Tubex moved to the Aberdare site in the mid 1980s moving from engineered plastics to specialise in tree shelter production. In the basic sense Tree shelter protect saplings during the critical years of growth.

£21 Million Shelters leave the Aberdare plant each year with a large majority being made from sustainable plastic. The shelters are produced from raw material in pellet form, being extruded through dies to create the correct profile for the customer's needs. Our shelters have been specially designed to provide the right solution for a trees need. Over the years Tubex has developed unique features that all contribute to the effective establishment of tree growth. Historically once a shelter had left the facility and completed its life cycle there was no knowledge what happened to them but case studies discovered one of 3 things happened.

- 1) The shelter degraded away into the soil over many years
- 2) The shelter were recovered and buried in landfill
- 3) The shelter were burnt by the farmers/ landowners



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The principal drivers for the innovation

Innovation has always been a part of Tubex including the invention of Tree shelters in the first place in a partnership with forestry commission. As far back as 2006 Innovative steps were being made to develop plastic compounds (called 12D) that were biodegradable so they did not remain as solid pieces of plastic waste in the environment. This innovative product was very popular in the Market right up until approximated 2017/2018 when David Attenborough on the BBC released Blue Planet. Plastics in the environment was being highlighted, publicly broad casted and part of government talks in parliament. Immediately Tubex carried out some market research and although distributor and customer feedback was positive, there was an overwhelming feeling that micro-plastic's may be produced. The OXO degradable 12D product may not be as environmentally friendly as first thought so a decision was made to remove the product from the SKU range.

A gap was now in the Market and plastics had started to get a bad name. Once again, Tubex set out on an innovative journey by not offering an alternative to the Biodegradable Shelter but a recycling and collection scheme aimed at the Plastic Tubes at end of life. There was an overwhelming feeling that many companies recycle thermoplastics in the form of food containers etc. so why couldn't Tubex do it with Shelters. The Biodegradable Tube worked on a cradle to grave method where as a recycling scheme is more circular where at the end of life the shelter would be turned back into a raw material and reused.

Unfortunately when presented to the customers there was very little buy in but things were soon to change.



The barriers and risks faced by the company in developing this innovation

Plastics are versatile materials, but the way we use them is incredibly wasteful. We take oil and gas from the earth to make plastic products that are often designed to be used only once, and then we throw them away. This is what we call a linear take-make-waste model. For a small company such as Tubex recycling plastic was costly and inefficient. Many Barriers stand in the way the way of industrial recycling as been seen with domestic recycling.

1. Physical barriers:-including limited access to the correct type of recycling bins and collection services. Also trees tend to be in remote locations so access is an issue.
2. Behavioural issues- such as foresters/contractors assuming they're too busy to recycle or that its always been that way where shelters are left in the environment.
3. Lack of knowledge or understanding-about what can get recycled and 'how can plastic that has been soiled or contaminated be recycled'.
4. Attitudes or perceptions: Though process's that recycling is a waste of time or there is no payback.
5. Cost- the main Barrier. The product has already been paid for when purchased so why should another payment have to be made.
6. Legislation: lack of legislation around the agriculture and forestry sectors.

The key determinants in the process of committing to develop the innovation

In the first instance the barriers spoken about can tend to dampen a company's desire to innovate but there will always be more reasons to continue with innovation. To survive in Business almost all companies have to evolve and not rest on laurels. History has shown that companies that do not innovate well tend to go out of business or no longer be key players in their sectors. Blockbuster and Nokia are two examples of well-known companies that failed to innovate correctly.

To remain profitable and keep products relevant then innovation has to be constant and for Berry as a corporate company, the message of innovation engrained in the DNA albeit not the main driver of innovation for the Tubex plant.

The major determinant of innovation at Tubex is people. Even before plastic in the environment had been part of main stream media the passion of Tubex staff to be thinking about the environment and CO2 impacts of producing plastic products was evident. This was not just at a leadership level but at the shop floor, employees are accustomed to ensuring in their areas recycling and segregation of waste is carried out correctly and suggestions were being raised from shop floor level. Many suggestions were put forward on how Tree shelters were collected from the forests and Tubex were meeting with distributors to try and get them to understand the longer term impact of leaving plastic in the environment. Tubex didn't have the answers at first and from a cost perspective the project was a loss leaders but the message and longer term goal was very much correct.

2018/2019 saw two major key determinant that really drove the determinants.

1. Plastic in the environment was now a key topic in parliament and plastic tax was being introduced for all plastic processors who did not use recycled content in their products.
2. Berry had acquired the RPC group in which part of the group specialised in plastic recycling. This was not just clean plastic but they also had wash plants, sink tanks and pelletisers so a one stop shop for recycling.

These two determinants changed things for Tubex and this type of innovation didn't now make sense just to Tubex but distrusters were now on board. With further legislation looming, the barriers were starting to fall.

The processes and technologies which the company used to carry this development forward

The first process of this innovation was marketing but internally Tubex had no marketing team. The business had disbanded the marketing team during previous acquisitions and given that most product are sold through distributors its was them that were relied on to promote the products.

Berry globally has a large marketing team so support was given from day 1 along with an experienced marketing team in the recycling plants at RPC that had been acquired by Berry.

Very early on in this innovation Marketing joined operations teams at RPC wash plants to discuss how they have had success in reprocessing plastic, marketing it in the right way to the end users and making it economic and sustainable.

From a technology perspective, the wash plant is a key factor and having that technology within Berry is a game changer to the recycling innovation project. Third party companies would not have to be used and waste streams will stay within the group not just reducing cost but also the carbon footprint.

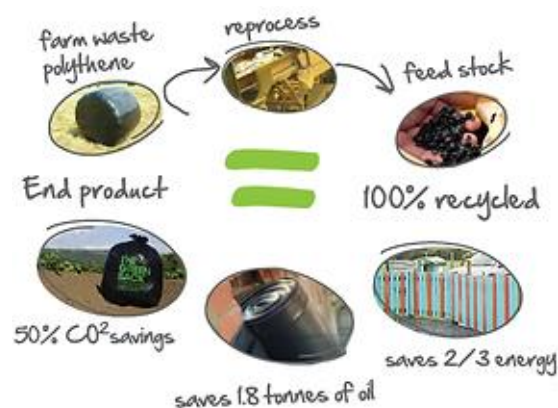


The extent to which the development relied on resources external to the company and the ways in which the deployment of these resources was managed.

Berry bpi is a pioneer of plastic recycling in Europe. Much like Berry Tubex the mission to increase the amount of waste plastic recycled in the group as part of Berry's commitment to the environment, and the core sustainability strategy underpinning the business. Over the last 30 years Berry's Bpi sites have heavily invested in polythene film washing and recycling. More recent additions include a state-of-the-art wash recycling plant that created the ability to recycle Polypropylene, the material of use for Tubex. This resource was external to Tubex and with RPC/Bpi Division being new to the group no relationships were in place.

A strategy was set up to manage the relationship and with all Berry sites already asked by corporate to adhere to the 'One Berry' philosophy and sharing of best practices communication lines were almost immediate.

Directors in operations, marketing, accounts and business excellence from both divisions were introduced to each other and conversations were opening up. The relations had started and instantly a key external resource to Tubex's innovations had become apparent. BPI already had a successful close loop initiative underway that was very similar to what Tubex was looking at albeit with farm waste not forestry waste. Agricultural films were being collected from farmyards, often heavily contaminated with soil and general debris. The waste plastic is washed, cleaned, and then extruded or 're-born' as plastic pellets. (recycling, n.d.)



How management overview of the development was maintained

Once the relationship with RPC-Bpi was established the directors took a step back and the plant leadership team took over to start the strategic planning of the innovation and how it would work in reality. Tubex split the innovation into three categories:

1. Front end touches

- Correspondence with competitors was set up to look to involve them in the innovation as a joint venture. This is not a new concept and has happen for many years especially in the automotive and technology sectors with GM and Toyota being key examples (Gary Hamel, 1989). Tubex felt that if the main manufacturers in the industry were on board with the same end goal then changing the mind-set of the end user would be easier and buy in improved.
- Work close with distributors- This is where the Marketing team that had been vacancy for so long reconnected. Not only was a new innovation be introduced but Tubex's distributors could lean on Berry's marketing team to help support marketing of the original and new product ranges and projects.
- People- project teams were set up to research Market conditions, raw material prices (using current and forecasted plastic index), Government legislation

2. Innovation development

- Engineering- new machinery as Balers, banders, bunds and wrappers would need to be brought into site to ensure goods brought back to site could be processed but not cause plastic pollution and are contained correctly.
- Logistics- How does the shelters get collected from the forests, then get back to South Wales with the least amount of touches and least amount of impact to the Carbon footprint. (Charnett Chau a, 2021)

- Potential challenges- things outside of scope that Tubex have no touch upon.

3. Commercialisation

- Return on investment- The innovation was first developed as a loss leader but interest in the innovation meant that it could be a break even project. A money making innovation was not the idea but more of a way to sustain long term business. Marketing managers and account managers were allocate to lead this section.
- Process- In house process and new technologies had to be developed by process engineers managing the required steps achieve a reliable process.
- Launch- the marketing team launched the products using media and digital advertising. The innovation was in trade shows and magazines. Social media platforms highlighting the innovation and collaboration with key distributors became a regular thing to see.



The extent to which you feel this innovation process represents best practice

The use of plastics has increased twenty fold in the past 50 years. While the material has many benefits, we now know there are negative consequences if it becomes waste or pollution.

Documentaries such as Blue Planet II, showing the impact of plastic pollution on wildlife around the world, have shocked and spurred a public backlash against the material.

In 2016, the Ellen Macarthur foundation published a report which showed that most plastic packaging is used only once, and only 14% is collected for recycling. 95% of the value of plastic packaging material, worth USD 80-120 billion annually, is lost to the economy. (foundation, n.d.).

The stats are very similar outside of packaging where plastics such as crop covers, silage wrap, straws etc. are very linear in use and work on a cradle to grave method. Statements have been made that the most environmentally friendly way to grow trees is without tree shelter installation but any articles and Journals have contradicted this. The journal article Science of the total environment studies the total life cycle assessment of tree shelters planting focusing on the total carbon footprint.

Results in the journal show that planting seedlings without shelters yield the least carbon emissions amongst the scenarios investigated. However, carbon emissions associated with planting trees with and without tree shelters become negligible when considering the amount of CO₂ sequestered by a tree over 25 years, suggesting that the choice should be based on other environmental categories (Charnett Chau a, 2021). This is proof that Tubex has a sustainable business where Tree shelters are required but plastic in the environment will continue to be an issue if the current way of allowing shelters to degrade over time remains.

Analysis also demonstrates that PP shelters are generally preferable to bio-based alternatives, including PLA and bio-PP, in both Current and Prospective Scenarios. Land Use for bio-shelters scenario yield the highest normalised. Considerations of leaving PLA shelters to bio-degrade in the environment were made but this scenario yielded the worst environmental performance in most categories and in terms of weighted results. End-of-life treatment options revealed that recycling is

the most favourable in both Current and Prospective Scenarios, with closed loop recycling outperforming down-cycling. Many more magazine reports yield the same results which is a very good indicator that the innovation of the recycling scheme offering is a best practice that can be copied by many other sectors. The most common method for the recycling of plastic waste is mechanical recycling (Al-Salem, 2009) and this has had many articles in the press but mainly in post-consumer not industrial waste. This process typically includes collection, sorting, washing and grinding of the material. Steps may occur in a different order, multiple times or not at all, depending on the origins and composition of the waste. This proves that Tubex' s innovation is following a best practice that has stemmed from other sectors.

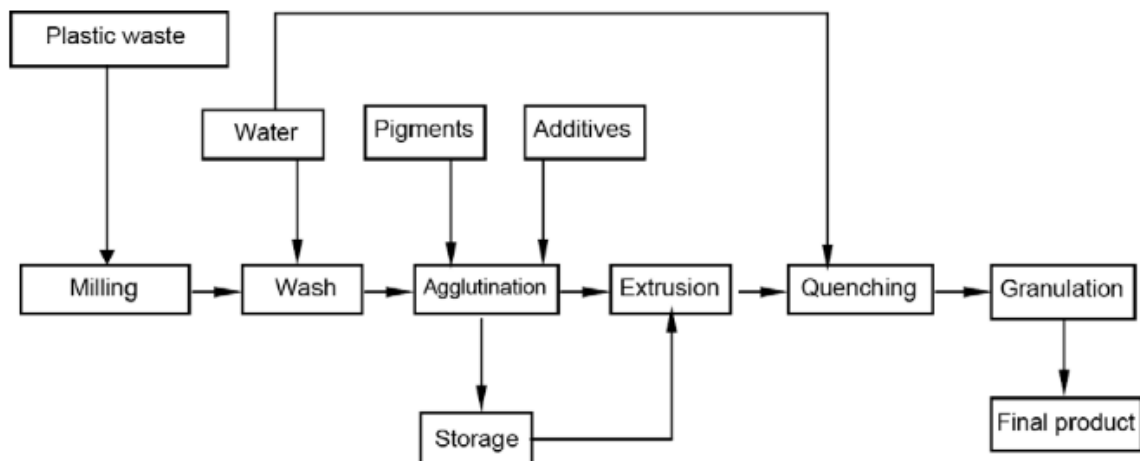


Fig. 3. Mechanical recycling steps as described by Aznar et al. (2006).

Your report should also provide your own critique of the whole innovation process, and an evaluation (to the extent to which one is possible in the case of very recent innovations) of the success of your chosen innovation

Success of Tubex innovation must firstly be measured in one major way. Did the innovation receive buy in from the end users and has the primary goal of lowering plastic waste been achieved. The benchmark of most recycling schemes is reduction, reuse, composting, recycling, energy recovery while avoiding or keeping incineration and landfill to the barest minimum (Getora, 2020). Since the launch of Tubex's innovation recycling has become a hot topic with Recycling crucial to reducing the loss to the global economy with the World Economic Forum estimating plastic packaging waste accounts for £80 – £120 billion annual loss (Opsomer and Pennington, 2016). Measuring success of the innovation against the standards that have now become a common Phrases in Recycling will be:

- Reduce- Each recycling batch run using the Tubex recycling scheme will result in 24 Metric tons of plastic removed from the environment equating to almost 200000 individual tree shelters (Laird, n.d.). With largest UK distributors on board with the recycling scheme the interest in reducing plastic waste has grown dramatically. Green-tech, British hardwood and Cheviot trees are now all distributors that not only offer the Tubex tree shelter recycling scheme as a service but also offer their facility as a hub for farmers to drop off their old shelters to a collection point. Once enough shelters are collected they can be sent for recycling in one large batch again reducing Co2 emissions.
- Reuse- It can be possible to reuse plastic tree shelters and guards. However, by the time the tree is established the tubes are often starting to degrade or cannot be removed without cutting them off (commission, 06)
- Recycle-a major challenge of producing recycled resins is lack of compatibility between different plastic types and the associated contamination introduced during the recycling process that may be difficult to detect. By using only Tubex tree shelters in the recycling

scheme and not other manufacturers, a control of what plastic is in the product is available.

Tractability of what has been used in the make-up of the product is available through archives. The material will be re-used by Berry Global to manufacture new tree shelters or in other businesses within the Group. Berrys Plasgran facility is one of the UK's major recyclers of rigid plastics. Among its feedstock is local authority-sourced material including source segregated PP pots, tubs and trays and bottles from materials recycling facilities (MRFs) and plastic recycling facilities (PRFs) as well as some HDPE (Eminton, 2022). They also have the ability to consume Plastic that is unusable in the UK's Berry sites. Plansgran's Plaswood Recycling case, which provides a good example of how to assess a new business concept with plastic innovation is mentioned in managing innovation by Bessant (J Tidd, 2013).

- Cost: Economic factors are also seen as key determinants of the viability of thermoplastics recycling namely, the price of the recycled polymer and the cost of recycling must compare favourably to those of the virgin polymer and alternative forms of acceptable disposal respectively (Hopewell et al., 2009).

When evaluated against a successful circular economy model such as the Dell reconnect innovation there is alignment. The Dell Reconnect program is a clear example of a how the circular economy aims at social development and inclusion through a tripartite of strategies consisting of reuse, refurbish, and recycle (Giovanni, 2022).

Although Dell recycle electronic components the program highlighted that the it could also work for plastic packaging. Dell were seeing the same issue as Tubex saw with end users initially seeing no value in plastic recycling. Despite the circular economy is gaining increasing levels of attention, only 30% of plastic waste is collected for recycling in Europe and most of the waste is down-cycled into materials with a lower value than that attributed to the original product (Calleja, 2019).Down cycling of plastic in the economy is caused by contamination with organic and inorganic matter. Tubex Tree

shelters will contain contamination of both matters so although they are treated, washed and reprocessed the plastics still downgraded. Mechanical recycling is used widely in Europe and elsewhere where the process involves sorting, washing, shredding and melting of plastic waste to produce granulate and finally new plastic products albeit as a downgraded plastic so cannot be used in all applications. (Ragaert, 2017).

This feeds into the final evaluation of if the downgraded product becomes large enough that it outweighs how much can be processed in house then the innovation may cause a problem of too much raw material. This downgraded plastic cannot be processed in extrusion at 100% like virgin plastic but only used in smaller percentages. (Al-Salem, 2009). This is a factor that wasn't taken into account by Tubex as the interest in the innovation was not estimated to be so popular based on previous data from distributors. With the likelihood that only up to 50% addition can be added to products it may be a case that the downgraded plastic may have to be used at other Berry plants.

In summary, thermoplastic polymers are inexpensive, lightweight and durable which make them suitable to be formed into a variety of products that can find use in a wide range of applications in Berry and not just into our tree shelters. In the 35 plus years, the introduction of plastics to the environment has increased significantly and if the tree shelter recycling innovation can help with a small percentage of that then it has been a success.

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