

ThreeD within the R&D and Manufacturing Market

**Assignment No. Two: Product Innovation / Feasibility in Collaboration with ThreeD**

**Module: Technology Entrepreneurship**

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## Why R&D and Manufacturing

Manufacturing involves the mass production of material or objects using machinery. Cost of labour, material and power are all factors of this. With 3D printing involved within manufacturing, this allows for the lower consumption of power with one machine doing the work of many along with labour decreasing substantially which can allow in some situations only one user per machine. 3D printing within the manufacturing market also improves the detail of material being mass produced due to the just one design being used and one machine with less processes doing all the labour. [12]

Using this technology for research and development within manufacturing has the benefit of being able to modify a design of an object for improvement or even create a completely new object. This really improves the time it takes for companies to create prototypes with less process steps and gets a valid product in the market saving a massive amount in costs. [16]

As the price for 3D printing machines declines they will soon become a privately owned household item which will decrease the amount of customers who use 3D printing publicly. Using 3D printing for R&D in manufacturing businesses would be a more strategic approach for a long term plan.

## Specific Applications

* Construction Industry

Throughout the world it can be seen that construction is an up and coming industry within 3D printing with major projects both in America and China. One example involves a housing charity company known as New Story and a tech company, ICON which have teamed up to mass produce a community of homes within El Salvador for families living in poverty and unsafe conditions. This project can be done similarly within Ireland to deal with the homeless crisis or even for student accommodation as it allows for affordable and rapid manufacturing. Schools, bridges, hospitals etc. are among many others within infrastructure that can be created using 3D printing. [1][2]

Today there is no company within the Republic of Ireland who have invested within the construction industry of 3D printing. This would be an advantage as there would be no competition to deal with and with this technology a reduction in the price of building and buying property. This reduction in price would come from human and material resources due to less labour since the construction is mostly machine based and the material that’s needed will be used with no waste left behind. [1][2]

The disadvantage with this approach would be the machinery needed in order to construct would have a high cost in comparison to original 3d printers. Standards for construction would also have to be studied to understand the regulations when designing an infrastructure. [1][2]

* Automotive Industry

3D printing within automotive is another manufacturing industry which is increasing in revenue which is predicted to reach around $2700 million by 2023 within the US. The reason for this growth is that the R&D allows for increase of production and decrease in cost when examining new designs for vehicles. [14][7]

3D printing can also be used for creating vehicle parts which need repairing or an improved modification. The benefits of additive manufacturing allow this to be done due to the many methods and materials that can be used.

* Aerospace Industry

Within the aerospace industry additive manufacturing is very beneficial with the obvious perks of low cost, rapid production and no waste in material but there is also the advantage of being able to create light material which reduces the consumption of fuel and C02 emissions and also increases speed. [15]

Ryanair and Aer Lingus are the two main airlines within the Republic of Ireland. No evidence can be found of these two companies carrying out R&D for additive manufacturing technology to help their business reduce costs.

## PESTEL and SWOT analysis

PESTEL is the analysation tool used to monitor the macro-environmental factors which affects the organisation or company, while a SWOT analysis evaluates the external and internal environment of an organisation or company. PESTEL is an acronym for Political, Economical, Social, Technological, Environmental and Legal factors. Whilst, SWOT is also an acronym for, strengths, Weaknesses, Opportunities and Threats.

For ThreeD this can be very useful to make better decisions to allow the company to succeed and progress in the future.

PESTEL Analysis

* Political Factors

With 3D printing growing in Ireland, 3D printing allows the capability of collaboration in design, Technology, Materials and workforces. This ultimately allows the the organisation or companies and its members access to R&D funding as well as government contracts and intellectual property.

* Economical Factors

⅔ of manufacturing companies in Ireland such as Henkel. A chemical and consumer goods giant whose brands include Persil, Right Guard and Loctite are setting up a new multi-million euro 3D printing operation in Dublin who will create 40 new specialised jobs as it establishes its venture into additive manufacturing [5]. This will allow the company to source its manufacturing locally. This decreases the need to manufacture products internationally greatly reducing costs. This leads to a better economical status.

* Social Factors

As with the economical factors, and more companies implementing 3D printing each year. **Re-shore** is a big social factor where companies are trying to move their manufacturing back to Ireland. As described in the economical factor, more jobs would be created in Ireland. **Health** also plays a big factor in the social side. 3D printing can be used to recreate organs to improve the overall health conditions. This would be ideal for ThreeD printing as there is a need for such service.

* Technological Factors

3D printing and technological development allows hardware to evolve rapidly, allowing the manufacturing of bigger and better components with greater

precision and finer resolutions at higher speeds and lower costs.

* Environmental Factors

One of the advantages of 3D printing is that they are more sustainable in manufacturing. This includes less materials wasted, Better energy efficiencies for transportation and manufacturing.

* Legal Factors

3D printing has its disadvantages. Patented and copyrighted files can be easily copied or downloaded. This can lead to counterfeit products to be printed, leading to lawsuits and problems. Another problem with 3D printing is that in can be used to manufacture dangerous weapons and items that can cause harm to the person or public.

SWOT Analysis

* Strengths

One of the strengths of ThreeD is its **Instant quote calculator** on the website. After some research, most competitors do not have any instant quote calculator, but a quotal service that takes some time. This gives ThreeD an advantage which save consumers time.

Another strengths is ThreeD’s potential market. The estimated annual revenue of the 3D printing market is 12 billion U.S dollars by the end of 2018. As the world becomes more integrated and data driven, companies would be able to adopt better and quicker to new technology. 3D could possibly play a big factor in the future.

* Weaknesses

As with any other company or organisation ThreeD has its weaknesses.

The first would be its **website**. With the lack of information and a very dull web page gives a reflection of the company. With the lack of Image and video to provide evidence of work shows a lack of professionalism and may cause trust issue between the consumer and ThreeD, which could lead to consumers choosing a competitor as their choice for 3D printing.

**Marketing** plays a big role in companies as it is the bridge between the consumer and companies. Without marketing consumer would have no evidence or knowledge that ThreeD exist. With Social Media being one of the biggest influences in the today's population and ThreeD only having Facebook as its social media outlet, this greatly misses the potential customers. By expanding ThreeD’s social media outlet to such as Instagram and Twitter. More people would be aware of the company and the website, as well as the work it produces.

**Branding** also plays a very big factor. ThreeD currently has no service brand and for the company to progress in the future it needs to create a service brand in the market. With no branding there is no consumer trust and this leads to no potential customer. Branding allows the business to stay in the consumers memory as well inspire customer confidence to invest in the service and the company. In order to create a high quality service brand, ThreeD needs to invest in its Marketing and quality of its service.

* Opportunities

R&D and Manufacturing presents a very good opportunity for the business to thrive.

Automotive manufacturing industry has been a quick adapter of 3D printing. It is used for prototyping for such as hoses, fuel injectors and such. With 3D printings capability to use alternate materials, this gives the opportunity to create foam sealants and air fluid filters.

As mentioned above the use of alternative materials for 3D printing produces many opportunities. Aerospace is another manufacturing market that can be captured. NASA has used 3D printed foam which has been used to manufacture batteries, solar cells and radiation shielding.

Biomedical is another manufacturing market that can be captured, where as the 3D printing can come into force by design and manufacturing products such as prosthetics and bone grafts created by titanium foam. [6]

* Threats

There are many threats to take into consideration when it comes to ThreeD printing. There are too many competitors who provide a high quality 3D printing Services. Which means it’ll be hard to compete with an established 3D printing service, For instance such as 3D Printing Ireland [7]. From the website we can take into consideration the abundance of information that can be found regarding the 3D printing service it provides as well as an FAQ page, About us and Services and Applications. It is evident of the high quality products it produces with pictures and videos whilst the website looks extremely professional, This gives the consumer the confidence to trust the service.

## Porter’s Five Forces[8]

1. Competitive Rivalry

There are quite a few existing companies that provide a 3D printing service as their primary source of business. Many of these businesses also provide a volume production service. As rising interest in 3D printing for various reasons, there are an increasing amount of businesses entering the market. Rivalry in the market will increase and become more competitive. Buyers and suppliers have increasing number of businesses to trade with. This means consumers have other options to choose from, meaning marketing and pricing will be important to entice customers.

Although ThreeD offer one aspect that other 3D printing companies do not, this is the instant quote service. This gives ThreeD a unique selling point that could be marketed to potential customers.

2. Supplier Power

The main item needed for frequent supply will be the filament for 3D printing items. This is a common product, for business and hobby use. There are many online suppliers. The number of online suppliers means it will be easy to find a cheap, reliable supplier for the filament.

The ease of access to the product will allow easy, and cheap switching between suppliers if suppliers increase prices.

3. Buyer Power

Buyers will have several places where they could take their business. Buyers will have quite a bit of power and will be cost-conscious. Using the quick quote service customers will be able to quickly assess how much a project will cost, this may appeal to customers who want to complete a project quickly. If buyers have more time on their hands, they maybe more likely to wait for other, slower pricing services in which case buyers have more power to look for the cheapest service possible.

It would also be cheap for customers to switch to other service providers, so being cost effective is important to getting and retaining customers.

4. Threat of Substitution

As well as competitors, and the buyer’s ability to outsource its 3D printing needs elsewhere, a potential customer may be willing to purchase a 3D printer of their own if they have a large need for 3D printing prototyping. If a company does have that large need for 3D printing they may decide it would be more cost effective to do the 3D printing in house.

This would affect ThreeD’s profitability.

5. Threat of new entry

As a relatively new market, it is still easy to enter the market. The regulations are not completely set for this sector, except for medical uses [9] which has some regulations. There are almost no barriers to entry to the market. Competitors can enter the market at will.

## Customer analysis

Target customers are those in automotive, aerospace, and other manufacturing industries.

These customers can use 3D printing for rapid prototyping, they can also use it to mass produce certain parts they require in volume. ThreeD will be able to meet the rapid prototyping needs and meet the mass production of parts when the print farm has been constructed.

The manufacturing industry has embraced 3D printing as a good way to prototype new products. The market for 3D printing is rising and expected to reach 20 billion U.S dollars by 2021.

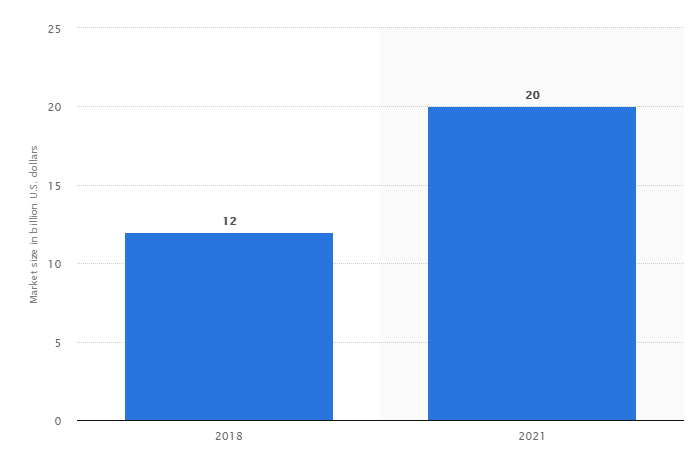


Fig. 1- Market size [10]

Reasons businesses outsource 3D printing [11]:

1. To avoid bottlenecks, outsourcing 3D printing allows companies to keep production moving even at busy times when they normally use in house 3D printing.
2. Lack of equipment on site, companies looking prototype without in house 3D printers must outsource.
3. The cost of owning and maintaining a 3D printer can be costly, if the company does not think it would be more cost effective to do their own printing they may turn to outsourcing.
4. Outsourcing to a specialist company like ThreeD can be more beneficial for a company who wants quality 3D printing, but does not want to train in house employees.

## Conclusion

The aim of this paper was to illustrate and identify the strengths, weaknesses, opportunities and threats, which can occur within the R&D and Manufacturing of a 3D printing company. For that matter a PESTLE and SWOT analysis was undertaken. Based on the research and findings, this shows that 3D printing has its special strengths and weaknesses, that allows this technology to be distinguished from traditional manufacturing methods. The findings also betrays that 3D printing uses less materials and produces less waste to manufacture products at a high rate. It is also evident of the highly competitive market for 3D printing.

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