
# *APPLYING FIVE FORCES IN THE COMPETITIVE ADVANTAGE OF 3D PRINTING TECHNOLOGY IN THE FOOTWEAR INDUSTRY*

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# Contents

# 1. Abstract

This paper is about analyzing the 3D printed athletic shoes market from strategic viewpoint. In the beginning, the 3D printing technology and its applications are introduced briefly. Then, the SOWT analysis is used to evaluate the strengths, weaknesses, opportunities and threats of using 3D printing technology in manufacturing process. Moreover, the global and local market share for sport wears are cited. After that, Porter's Five Forces technique is used to determine whether the 3D printed athletic shoes market profitable or not. The result of this analysis showed that the 3D printed athletic shoes is not profitable now but it is very promising business in the future. Then, three companies are mentioned as major companies specialized in sport wears entering in the 3D printed sport shoes market. These companies are Nike, Adidas, and New Balance. Also, the strategies of these companies to gain competitive advantages in the market are stated. Finally, we compared between the competitive strategies of Nike, Adidas, and New Balance.

## 2. Introduction

3D printing technology is a form of manufacturing, additive manufacturing, where 3-dimensional objects are created from digital file. In an additive process, an object is made by laying down consecutive layers of material until the whole objects are created. [1]

Current manufacturing process is corresponding to factories, machines, economics of scale and production line. This process costs fortune. Therefore, many companies resort to manufacture their products in developing countries to save money. However, 3D printing technology would revolutionize manufacturing process mainly in two ways that would minimize the manufacturing cost. First, the size of factories will be reduced because many parts of a product, or the whole product, will be created using 3D printers. Second, with 3D printing technology, companies will save a plenty of material from waste by using make to order process. [2]

Now, many industries start to use 3D printers to produce part of their products or making prototypes. Examples of these industries are automotive, architecture, commercial product, education and others. One of these industries is shoes industry. [3]

3D printed shoes market is an emerging industry. The growth of the 3D shoes industries is related to the growth of 3D printing technology. According to Wells Fargo research, 3D printer's revenues will grow from a $288M market in 2012 to $5.7 billion in 2017 reaching of 81.9% CAGR. Moreover, the number of 3D Printers shipment is expected to grow at CAGR of 95% (See chart 1). [4]

This report will focus on using 3D printing technology for athletic shoes industry. Now, there are many big companies specializing in sport wear such Nike and Adidas. Using 3D printing technology (or additive process) has many benefits for shoes industry for both companies and customers. For companies, they

will save a large amount of money and time used for manufacturing process. For customers, they are going to wear confortable shoes that are customized to fit their feet's size, and type.

Now, the uses of 3D printing technology in athletic shoes are limited. They only print some parts of the shoes especially the spike plate of the shoe (see Figure 1). The potential of printed sport footwear industry is high to print the whole shoe because there are now some efforts to print simple 3D shoes. [5]

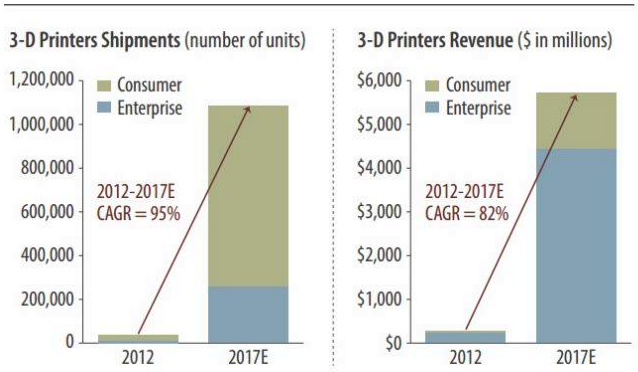


Chart 1: Printer Use is Migrating from Hobbyists to Commercial Manufacturers

## 3. 3D printing technology

3D printing technology is a process where solid objects can be made from a digital file. This process is done by a printer laying down successive layers of material until the object has been completely made. The digital file is made either by the use of a 3D scanner, which makes a copy of the existing object or through the use of a virtual design software program such as CAD (Computer Aided Design). There are different methods used in order for these printer to create the physical object. Some of the most common methods include melting or softening material to create the layers, there is also the selective laser sintering (SLS) and the fused deposition modeling (FDM). Using liquid materials is also an option; the most popular technique in this case is called stereo lithography (SLA). [3] [1]

## a. Applications

There are many uses and applications for 3D printing technology including design visualization, metal casting, geospatial, prototyping/CAD, education, healthcare, entertainment, retail, and architecture. The option to reconstruct bones and body parts for forensic science and damaged evidence for crime scene investigations, and for fossils to help in paleontology are some of the great advantages of this technology.

Artists, architects, manufacturers, biotech and doctors have been incorporating this technology into their fields during the past years. [1] [3]

### i. Industrial Printing

This has been in the manufacturing industry for decades, even though it is not as popular for the general public. Manufacturers have used this technology for in the design process in order to create prototypes and for research purposes. This is called rapid prototyping. This helps save time and money for companies. For example, Nike uses 3D printers to create multi colored prototypes of shoes instead of spending weeks and thousands of dollars creating a prototype, now they spend only hundreds and can print/reprint the prototypes on the same day.

It can also be used for rapid manufacturing, which is a new method where companies use 3D printers in order for short run custom manufacturing for actual products instead of prototypes.

### ii. Personal Printing

It started growing in 2011 mainly for enthusiasts, due to the large development of these industry the printer are getting cheaper with prices ranging from $250-$2500. There are open source kits that can be

purchased for the user to put together which will be much more cost efficient or just purchase one from the manufacturer. [1] [3]

### b. SWOT

Traditional manufacturing process has been around for many years and it is the standard for many companies worldwide. With 3D printing becoming more popular companies have started introducing this new technology as part of their processes. There are some strengths, weakness, opportunities and threats to this, which will be noted in the SWOT analysis below.

| Strengths | Weaknesses |
|---|---|
| • Reduce time and cost.<br>• Improve fast prototyping and reverse engineering.<br>• Detailed outcomes.<br>• Efficient use of materials.<br>• Instant design feedback<br>• Easier to make changes on a design and see the results.<br>• Less labor required and less human error.<br>• More variety: multicolor, larger prints.<br>• Customization and innovation. | • Technology is still new, so there is still a learning curve.<br>• Not all materials are supported.<br>• The technology can only produce certain parts not a complete product. |
| **Opportunities** | **Threats** |
| • Limitations in terms of what it can manufacture.<br>• Implementation of different types of materials. | • New technology that is still in works.<br>• Higher costs for individual users.<br>• Size of output generated.<br>• Lack of skilled labor. |

Table 1. SWOT 3D printing vs traditional manufacturing [6]

# 4. Market Share

## a. Local (US)

Statistics show that the revenue of United States market for sport footwear is around 21.17 billion U.S. dollars in 2014. There are many competing players in the market. The market leader is Nike with revenue of 10 billion U.S. dollar, which equivalent to 46% of market share. Then, Jordan comes in the second place with share of 14%, i.e. $3 billion. The third largest player in the U.S. market is Adidas with revenue of almost $1.3 billion, which corresponding to 6% of market share. Under Armour comes as the sixth largest company with share of 3% i.e. 650 million U.S. dollars. The following chart illustrates the shares of the whole market for sportswear in the United States (see the chart 2). [7]

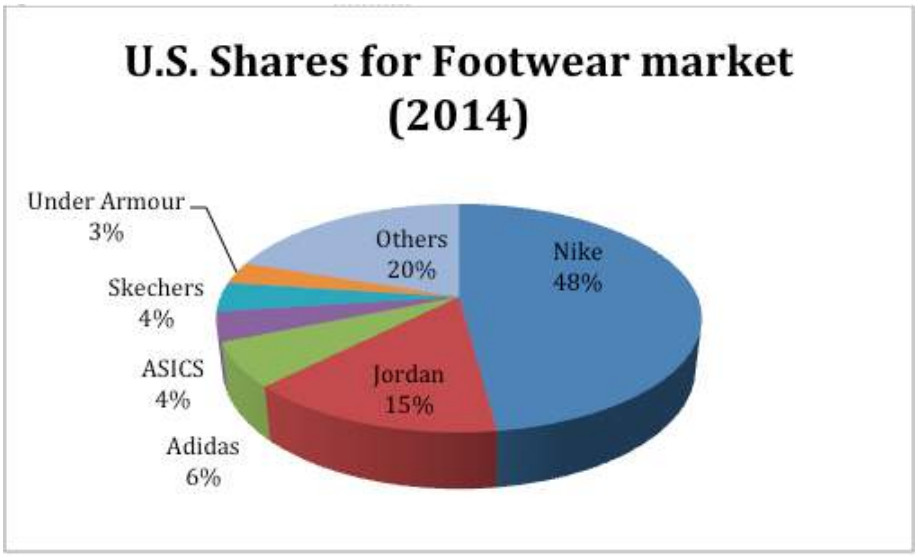


Chart 2: U.S. Market share for sort wear (2014)

## b. Global

The worldwide market for footwear can be categorized into three areas. These areas are casual shoes (40%), athletic shoes (30%), and various target-based product (30%). In this section, the focus will be on

the global athletic shoes market share. The global athletic products market valued 77.34 billion U.S. dollars in revenue in its 2013/2014. According to the statistics, Nike Inc. dominated the global market with percentage of 40 and revenue reached almost 27.8 billion U.S. dollars. Adidas comes in the second with 19.95 billion U.S. dollars revenue and market share of 26%. The following pie chart shows the worldwide market share for sport products in 2013/2014 (see chart 3). [8]

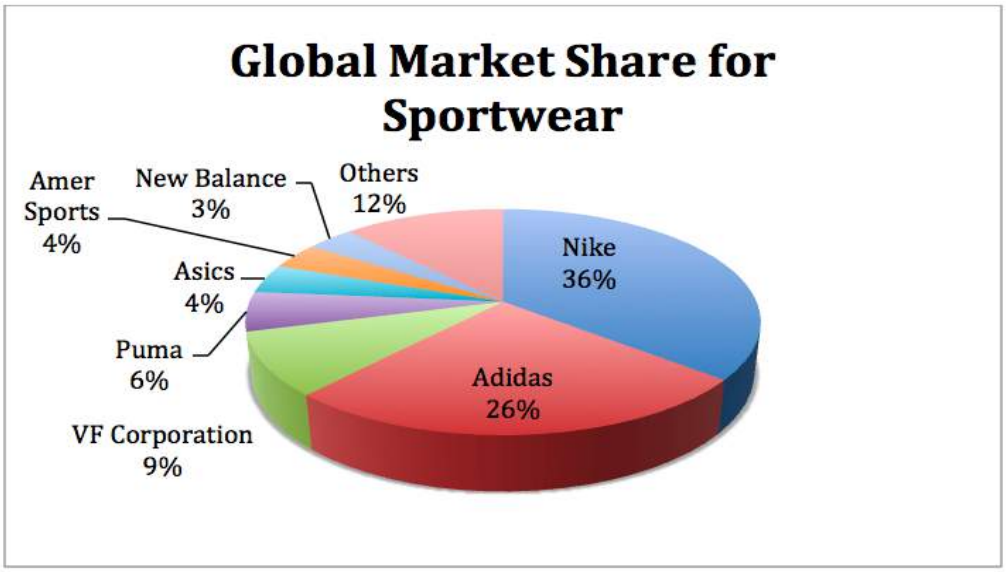


Chart 3: Global Market share for sort wear (2014)

# 5. Five Forces

## a. The Idea in Brief

The main reason of putting a strategic plan is to set goals for companies and then draws the way to achieve these goals. One of the most important goals, for many companies, is to have and sustain long-term profitability. However, there are many tools to analyze specified market and them predict the profitability. One of these tools is Porter's five forces technique.

The five competitive forces is a tool that helps strategists to analyze five forces that would affect the amount of profitability of companies. These five forces are (see figure 2): [9]

- Competitors
- Savvy customers can force down prices by playing you and your rivals against one another.
- Powerful suppliers may constrain your profits if they charge higher prices.
- Aspiring entrants, armed with new capacity and hungry for market share, can ratchet up the investment required for you to stay in the game.
- Substitute offerings can lure customers away.

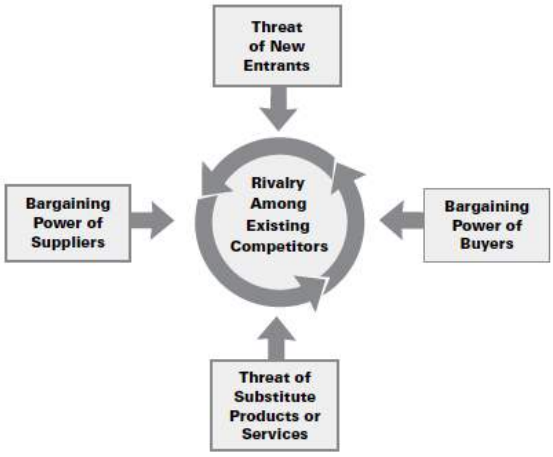


Chart 4. Five Forces Model\

## b. Applying Porter's five forces

In this project, Porter's Five Forces technique is used to determine weather the 3D printed athletic shoes market profitable or not. Therefore, a checklist is developed based on Porter's article "The Five Competitive Forces that Shape Strategy" to examine the five forces' threats or power. The checklist consists of 38 questions divided into five categories. The answers of these questions based on data from literatures. After answering the questions of each category, the result should show the

level of the power or the threat of a force. There are three levels, which are high, moderate, and low.

There are 9 questions to test the level of the entry threat. The output result was that the threat of new companies entering the market is high for many reasons. First, the production and marketing scale are not large, which attract startups. Also, startups do not need to invest heavily to be in the market because they do not need to have large factories to produce their products. Moreover, new companies are able to create, produce, acquire, transport or distribute goods to customers easily. There are no limitations in terms of distribution channels, which attracts startups. Also, the lack of government regulations that could limit the 3D printed shoes industry entices many new companies to enter the market. [9]

For evaluating the power of suppliers, there are 6 questions. The answers of these questions show that the power of suppliers is low even though the current number of suppliers is limited. However, the number of suppliers will increase in the future due to the growth in 3D printers market [5-2]. Also, suppliers are very interesting to develop the market and attract companies to the market.

In order to examine the power of buyers, eight questions should be answered. The final result is that the level of the power of buyers is low for many reasons. First the current targets customers are professional athletes who are not sensitive to the price of the products. Also, the industry could have heavy-volume buyers in the future especially with rapid development of 3D printing industry. Moreover, it is not hard to attract new customers to buy the products. Finally, currently, the customers are unable to manufacture the 3D printed athletic shoes in their homes. [2]

After evaluating the market, the result showed that the threat of substitute products was high for many reasons. First, the substitutes are available and cheaper than 3D printed shoes. Also, substitutes are easier to obtain currently. However, the substitutes are less quality than 3D printed shoes.

Finally, the checklist showed that the threat of competitors is high due to many reasons. First, there are many well-known companies began to get benefits of 3D technology to produce high quality shoes. Also, competitors are willing to pay a lot of many in marketing and R&D to increase their sales.

In conclusion, the 3D printed athletic shoes industry is not profitable for now. However, the market is attractive to enter because of the expected growth in 3D printing technology in the future. (For the full list of questions and answers see the Appendix B).

# 6. Competitive Advantage

This concept means that a firm sustains profits that exceed the industry's average. This is a common goal for most companies. There are different areas where a company can gain this, as every company is different than their strong point will differ.

## a. Michael Porter's types

Michael Porter is a remarkable authority on competitive strategy and the competitiveness and economic development of regions, states and nations. The advantages described by him are known as positional based advantages since these describe a firm's position in the industry as a leader in either cost or differentiation. [10]

There is also resource-based view, which focuses on utilizing its resources and capabilities in order to create superior value. The following diagram shows how this last concept works. [11]

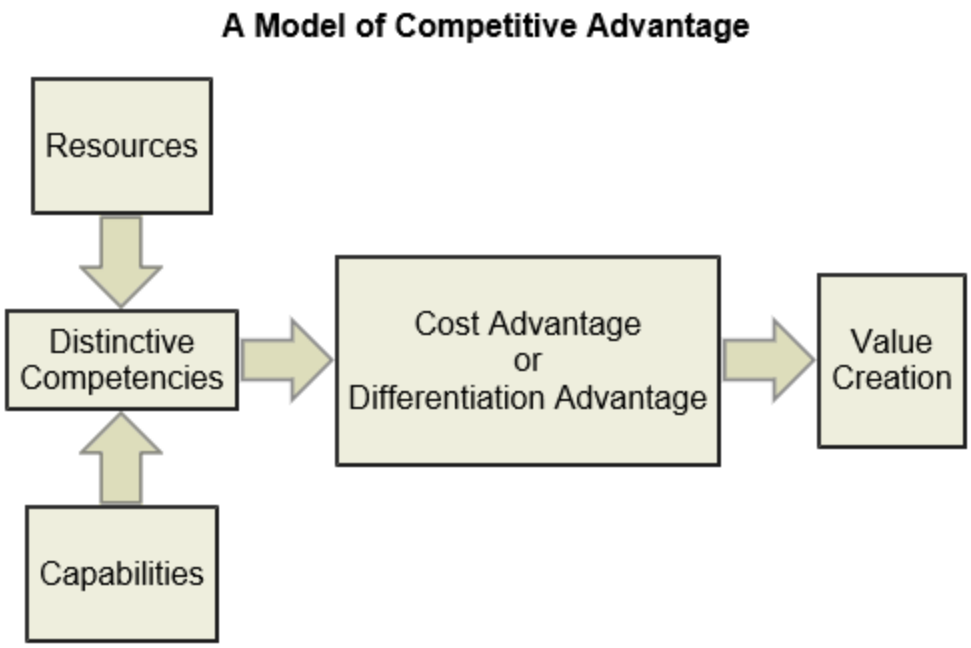


Chart 5. Competitive Advantage Model [11]

### i. Cost Advantage

This happens when a company can offer the same technology their competitors offer but at a lower price therefore having a cost advantage. In terms of this research, Adidas is the one that represents this type of advantage in comparison to Nike and New Balance. [11]

### ii. Differentiation Advantage

This means a company exceeds in delivering benefits from the ones offered by their competitors which causes differentiation advantage. Nike represents this type of advantage through innovation and unique styles. New Balance also falls into this category by having very specified target customers which allows them to deliver more benefits. [11]

# 7. Nike

## a. Background

Nike is Multinational Corporation with headquarters Washington County, Oregon, United States. It is one of the world's largest suppliers of athletic shoes and apparel, and a major manufacturer of sports equipment with revenues of $24.1 billion in 2012 and employing 44,000 people worldwide. They own Umbro, Converse, Cole Haan and Hurley International.

It was founded in January 25, 1964 as Blue Ribbon Sports by Bill Bowerman and Phil Knight. On May 30, 1971 the company officially became Nike, Inc. based on the Greek goddess of victory.

Their marketing strategy is essentially through sponsorship agreements with athletes, celebrities, college athletic teams and professional teams. [12]

## b. 3D printing usage

Nike has been using 3D printing for years to test prototypes since it is a much more efficient process in terms of cost and time. Recently they have been using this technology to produce football gear such as cleats and sports bags. Some of these products are The Nike Vapor HyperAgility Cleat, Nike Vapor Carbon 2014 Elite Cleat, Nike Vapor Laser Talon, Nike Football Rebento duffle bag and the Mercurial FlyLite Guard.

The Nike Vapor HyperAgility Cleat is one the three cleats influenced by the 3D printing technology using SLS plate construction. This is the second football cleat with this technology bringing innovation and athlete agility to a whole new level. See the image below for details. [13]

Figure #1- The Nike Vapor HyperAgility Cleat

Nike Vapor Carbon 2014 Elite Cleat was made for the super bowl XLVIII which took athlete insight and a great step into novelty. It is meant to help with acceleration, precision and impact in order to improve the speed of the game. Producing a cleat through the more traditional way would have taken about three years; with 3d printing this process has accelerated the design and testing process. Figure 2 shows the four large tri-star cleat studs on the toe grip zone and three conical heel studs to deliver additional traction. There are individual adaptive flywire strands that provide a customized lockdown fit for a better grasp around your foot. [14]

Figure #2- Nike Vapor Carbon 2014 Elite Cleat

Nike Vapor Laser Talon is a featherweight SLS built plate that weighs 5.6 oz and the first sport's 3D printed plate. It is designed to provide optimal traction on the football field and help athletes maintain their drive stance for longer. In figure 3, we can see the details of the printed outcome using the Selective Laser sintering technology (SLS). This technique uses high-powered lasers to fuse small particles of materials into the three-dimensional object. The SLS process allows for the engineering and creation of shapes not possible in traditional manufacturing processes. It gives the ability to make design changes within hours instead of months which accelerates the innovation processes [15]

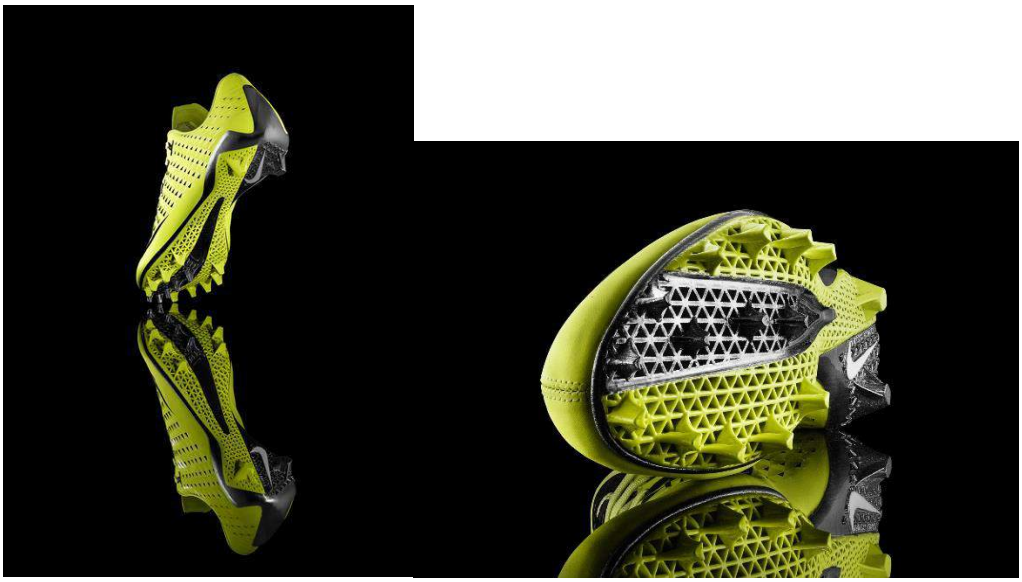

Figure #3- Nike Vapor Laser Talon

Nike Football Rebento duffle bag has optimal impact protection with much flexibility and breathability. The 3D printed hardware allows for unprecedented levels of customization and gives it a durable structure as well as lightweight. Mercurial FlyLite Guard is meant to replace traditional foam backing with a innovative webbed shock system that provides more consistent impact absorption hit after hit due to the fact that the pips cover a larger surface area. This is what gives the bag a more anatomical fit, more flexibility and thinness for lightweight results. [16]

Figure #4- Nike Football Rebento duffle bag

### c. Competitive Strategy

In order to be and maintain the world leader position Nike follows many strategies. In terms of corporate strategy, the focus is innovation and R&D in order to guarantee a profit for the long run. The emphasis is to create footwear, apparel and athletic equipment which minimizes injury, maximizes comfort and performance.

The business strategy is to be the best cost provider and broad differentiation strategy. Nike relies on strategic outsourcing and most of their products are manufactured internationally rather than in the United States.

Nike has extensive network which allows them to change alliance quickly with any company if that company fails to maintain their standards. Working closely with suppliers is an important step, especially when trying to reduce cost and achieve a superior quality.

Nike's marketing strategies have led this company to their big success. Hiring idols in the sports industry has created their brand name. In 2003, $32.4 million were spent in Net TV commercials and $39.8 in

magazine ads. To become a leader they are innovative, but to stay a leader the strategy must be sustainable. Therefore, the company has incorporated a greener company and provided support in education for third world countries (Business for Innovative Climate and Energy Policy). [17]

# 8. Adidas

## a. Background

Adidas is a German multinational corporation based in Herzogenaurach, Bavaria. It designs and manufactures sports shoes, clothing and accessories. It is the largest sportswear manufacturer in Europe and the second largest in the World after Nike, Inc. Adidas is the owner of Reebok, Ashworth and Rockport as well. It was founded in 1949 by Adolf Dassler. The company's revenue as of 2012 was 14.88 million euros. In the mid-1990s the company divided the brand into three sections: Adidas Performance, Adidas Originals and Style Essentials. In terms of marketing Adidas does game advertising, sponsorship and adicolor. Adicolor is a concept launched by Adidas in 1983 where the shoes (trainer's sneakers) were sold with tools to customize the footwear. It is a white leather shoe that you could put color on it to make it look how you want it to. [18]

## b. 3D printing usage

As well as Nike, Adidas has used 3D printing in their manufacturing line for time efficient and cost efficient prototyping. Now they are starting to use it to actually make their products as part of always looking for the latest technology to update its design, production process and development. Adidas was one of the first to install the Objet Connex500 3D printing system that has allowed them to succeed in creating value to their products. This is a newer model that allows the use of different materials to be incorporated into the printing; they used Objet's previous models for their prototyping.

The ability to print models from multiple materials allows Adidas Group to perform functional testing at an early stage of the design and development process, which saves time and enable the company to gain competitive advantage.

Before 3D printing, all the prototypes were hand made by 12 technicians using special tools to meet 3D specifications. Now a maximum of 2 people are required to produce the 3D models. The final product concept and customer wishes can be quickly fulfilled as well as errors can be detected immediately and therefore be eliminated.

The fact that prototypes are printed in 16-micro layers creates a lot of accuracy which conveys to a precise idea of what the final product looks like without the need for additional finishing, See Figure #6. [19]

Figure # 6- Adidas 3D printed footwear

### c. Competitive Strategy

Adidas mission is the make the Adidas Group the global leader in the sporting goods industry as they want to create as much value to the stakeholders as possible. It is all about creating value by creating premium products and responsive services. It is also important to ensure a high level of brand desire and satisfy customers. [20]

There are six key strategic pillars in order to achieve their goals:

1. Diverse Brand Portfolio, which is part of their multi-brand strategy allowing them to cater in every segment of the market from professionals to almost every consumer.
2. Investments focused on the highest potential channels and markets by studying consumers buying behaviors and patterns.
3. Creating a flexible supply chain, which is closely communicated helping in the customization of their products therefore influencing a wider range of customers.
4. Leading through innovation, leading to good quality of the final product.
5. Develop a team based in Adidas heritage
6. Become a sustainable company

### d. Challenges and Results

Adidas is a big company producing large amount of products worldwide. There is high demand and creating value for customer is a key focus for the company. There are always challenges, therefore solutions have to be found such as the 3D printer in this case. Some of the challenges and results in the 3D printing scenario are the following: [19]

Challenges:

- Enable designers to execute concept modeling using multiple materials.
- Create precise 3D models for functional, demonstrative and design verification.
- Shorten development, commercialization and production processes for new shoe designs.

Results

- Dramatic time savings and quicker time to market due to the fact that there are less steps now because of the multi-material 3D printing.
- Product development is optimized at an early stage.

- Models are high-quality which meets the high levels of accuracy and finish.
- Designers are able to explore their creative ideas, which improves innovation.

# 9. New Balance

## a. Background

New Balance Athletic Shoes, Inc. is an American footwear manufacturer based in the Brighton neighborhood of Boston, Massachusetts, United States. The company was founded in 1906 by William J. Riley and known as "New Balance Arch Support Company".

Their mission statement is that "New Balance aims to become recognized as the world's leading manufacturer of high performance footwear and apparel, by conducting our internal and external relationships according to three core values -- Teamwork, Total Customer Satisfaction, and Integrity."

The current CEO of New Balance is Robert T. DeMartini. There are two manufactures in United States and United Kingdom. There are 3,908 employees working at the company Worldwide. As reported in 2009, the total revenue of New Balance is around US $1.65 billion. [21]

## b. 3D printing usage

New Balance, the global athletic company, announced that they would get benefit from 3D printing technology in March 7th, 2013. The purpose of using 3D technology, according to New Balance's announcement, is to produce high performance footwear. These shoes are customized to fulfil the needs of professional athlete.

The price tag for a custom-printed shoe is probably astronomical at this point, and only worth it if you're an elite athlete. New Balance has decided to use AM to produce custom plates for each athlete.

“The custom design process begins by gathering data about how each runner moves on the track. New Balance collects each runner’s biomechanical data using a force plate, in-shoe sensors, and a motion-capture system worn by the runner. The data is analyzed to determine the best possible spike plate configuration for the runner, and the results are plugged into CAD to be printed on an EOSINT P 395, produced by EOS. The end result of the process is a track plate fit to each athlete, and at a 5% reduction in total weight as a bonus”. [22] [23]

Figure #7 New Balance runner’s shoes

### c. Competitive Strategy

New Balance Corporation is one of the largest shoes manufacturing company in United State. New Balance has been a brand producing products that meet the everyday needs of athletes. Managers in New Balance believe that a better-fit produces better performance therefore they produce variety of shoes that differ in shape, design, and size. Also, they improve their technology and production methods by maintaining the five factories inside United States to meet the standard criteria.

New Balance realized the completion to gain Also, they keep a price advantage by producing a variety of shoes with different quality with different competitive prices, which making the New Balance affordable luxury ones. Moreover, in order to attract more customers, New Balance enable their customer to customize their own shoes by choosing a favorable model, colors, and size. Also, they allow their customers to print their names, or nicknames at the back of the customized shoes

Also, New Balance has initiated “Moving Forward” program in three areas. Such program could help the company to gain the customer’s trust as responsible corporation. The first area is “Moving the Environment forward” by environmentally sustaining product and facilities. The second area is “Moving Forward Together” by creating a safe and healthy work environment for their workers and encourage the teamwork. The last area is “Moving Forward/ Giving back” by driving sustainable change through helping global communities where the company serves. [24] [23] [25]

# 10. Analysis

## a. Nike vs Adidas vs New Balance

These two giants (Nike and Adidas) in the sportswear industry have very similar strategies, the difference comes in to place in the implementation methods. Both companies focus on technology, innovation and quality. They also follow a premium price strategy offering premium price for good products.

Adidas focuses more on the European market and Nike has its focus on the American market. Adidas carries out all their production in Germany and recently started adoption Nike’s outsourcing style. Nike only does the design, distribution and marketing, and they outsource their production to China, Indonesia and Vietnam. [17]

New Balance shows a variety of prices and an affordable luxury. Specialization is in professional runners which allows for a better focus for their innovation projects. In terms of marketing they offer environmental initiatives, philanthropy and community initiatives, and investments in people. Customization for consumer’s products is a big part of this company to the point that you can add your name to your footwear. New Balance is also well known for their designs and comfort. New Balance seems to have a little bit of what both Adidas and Nike have to offer just in a more specialized/focused oriented strategy. [23]

Table 2 represents a summary of the competitive advantages that Nike, Adidas and New Balance posses over each other. A dash means that area is not present as part of the competitive advantage of that company, and a happy face shows that it is present: the green ones describe high rating and orange describe medium/low rating. Overall, in terms of this table results Adidas has the win but when it comes to innovation, research and the amount of products produced with 3D printing technology Nike has the lead.

| | Nike | Adidas | New Balance |
|---|---|---|---|
| Differentiation | ☺ | ☺ | ☺ |
| Price | - | ☺ | ☺ |
| Variety | ☺ | ☺ | ☺ |
| Style | ☺ | - | - |
| Performance | - | ☺ | ☺ |
| Marketing | ☺ | ☺ | ☺ |
| Advertising | ☺ | ☺ | - |
| Brand Name | ☺ | ☺ | - |
| Services | ☺ | ☺ | ☺ |
| Product Portfolio | ☺ | ☺ | ☺ |
| Customization | ☺ | ☺ | ☺ |

Table #2 Summary of Competitive Advantages

### b. 3D Printing as competitive advantage

This emerging technology is a strong evolving part of testing, research and development and manufacturing. This three giants in the footwear industry have been working with this technology for many years and are now making products with it that allow more customization for the user. It is also time and cost efficient for the business, and makes a consumer happier due to a better quality product

that is made for them specifically. At the moment, the 3D products that Nike, Adidas and New Balance have are not for the public; these are being released to professionals only.

In the long run, 3D printing could become a big part of how businesses work and eventually maybe even change the way we do business. There is a startup company, called Feetz that is producing shoes made 100% by a 3D printing via an online procedure where you send pictures of your foot and then the shoe is created for your feet instead of a general design. This will increase the comfort and fit of your shoes in the hope to have a more satisfied consumer.

Based on this, an online survey was made to gather information about how people feel about this new technology. The survey was posted on personal Facebook accounts and the answers are from people in that friends circle, so the answer could be bias but they still give us a general idea and show certain preferences. Figure 8 shows the results of the awareness about the existence of this emerging technology and how personalization is a very important feature for consumers.

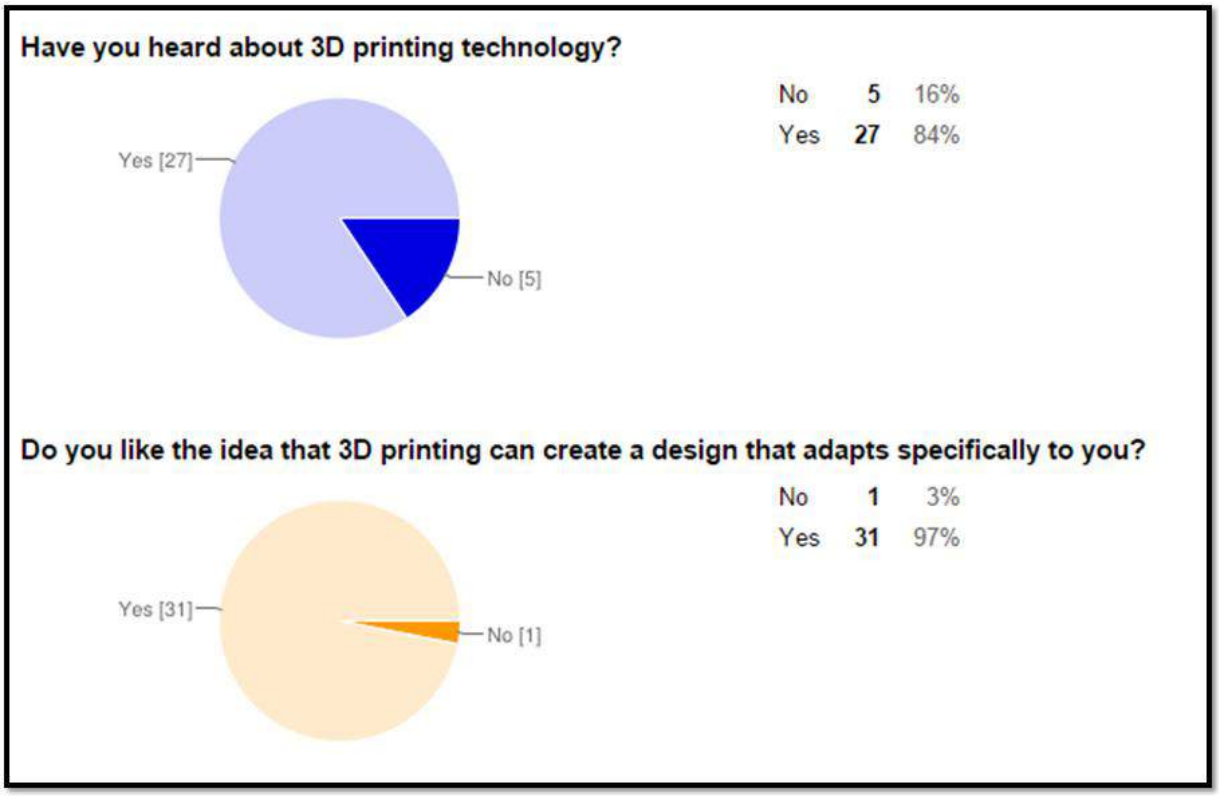


Figure #8 3D Printing survey Question 1&2

Figure #9 shows that people are willing to pay more for an item that is manufactured in a traditional way vs with 3D printers. In this case, handmade items must be considered since these are labor intensity, high quality, time consuming and costly. Also, tradition manufacturing processes are slower and require more labor therefore higher costs. In the future, this may be applicable but at the moment this technology requires a big investment and since it is still in the learning processes then “cheap” is not a good word for it.

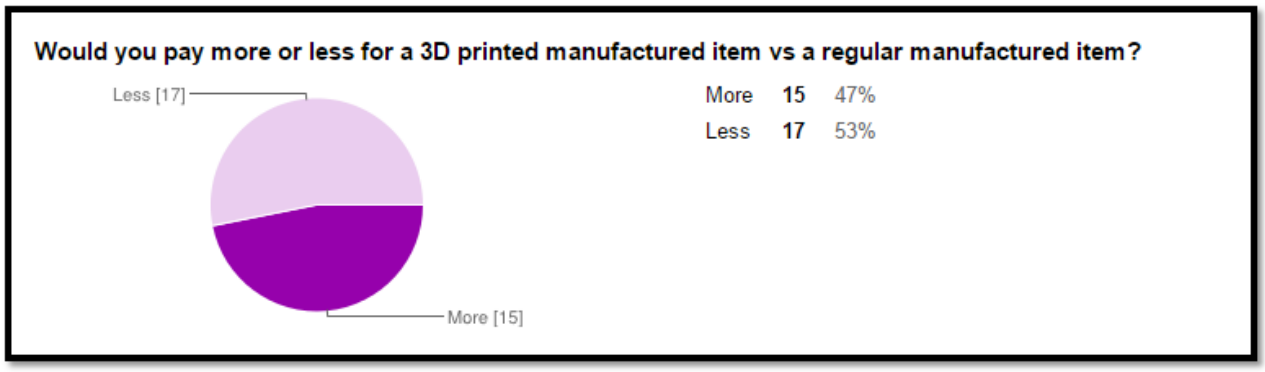


Figure #9 3D Printing survey Question 3

The next graph shows the main factors influencing consumers when purchasing sportswear. The top three in this case are: price (88%), quality (78%), feel/comfort (72%).

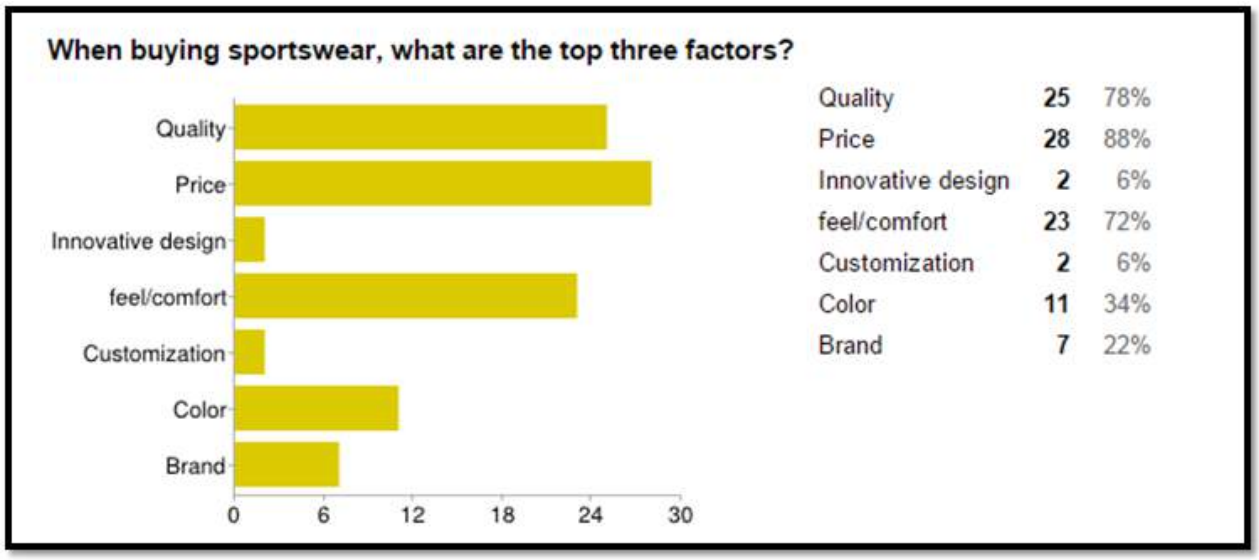


Figure #10 3D Printing survey Question

Figure #11 shows the results for two questions stating the willingness of consumers to buy 3D printed items. 81% of the participants would purchase these products and a 19% will not. Some of the reasons for this willingness or lack of are: customization (44%), innovation (31%), value

(13%) and others. As we can see from this results customization is a very important aspect in the footwear industry, which the 3D printing technology can offer at great detail.

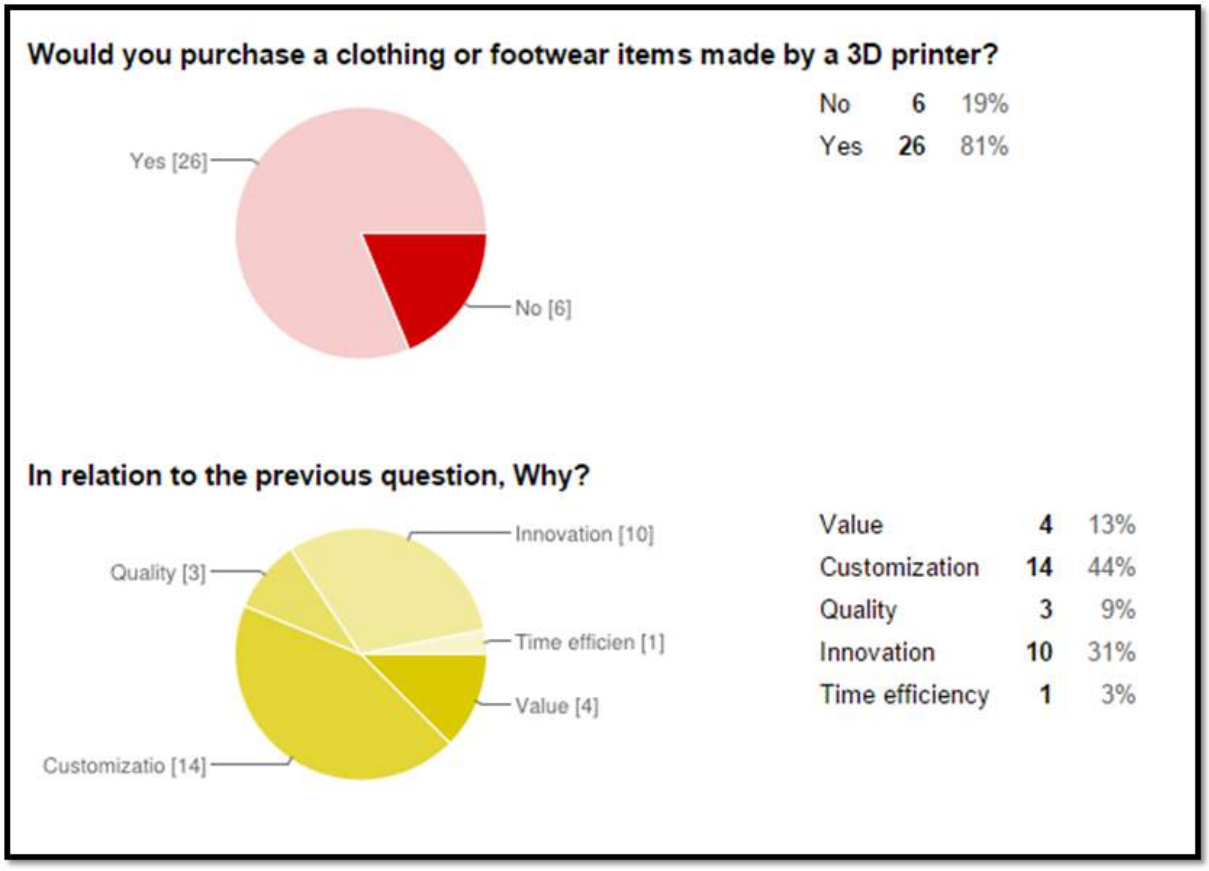


Figure #11 3D Printing survey Question

## 11. Limitations

In this project, it was difficult to find detailed information about the market and the competitive strategies of companies. The companies were contacted via e-mail and no response was heard back from anyone in the area of interest. This is very valuable information for a company so due to business privacy and integrity it is a very sensitive topic. Accurate data about competitors in the 3D footwear industry is very rare to come across. This is not only because information of this weight is very valuable and confidential, but also because 3D printing is still a new technology in the testing and developing stages.

The analysis is therefore based on literature review and an online survey done to friends. The survey can possess bias due to the fact that it was posted to our personal Facebook pages for our friends to see and answer.

## 12. Conclusion

3D printed athletic shoes market is an emerging industry. Big companies such as Nike and Adidas realized the importance of adopting 3D technology in manufacturing high performance customized shoes that fit the athlete's feet size and type. Using strategic tools to analyze the growth potential of 3D athletic shoes. The tools showed that the market is strong and have a lot of opportunities. Also, they showed that the industry is attractive and profitable because the powers of current suppliers and buyers are low and the threat of competitors is moderate.

There are three companies that are pioneers in using 3D technology in sport footwear are Nike, Adidas, and New Balance. Nike is the best in the market right now because they do variety of high-end products.

For more future studies, scholars could study the 3D printed sport footwear shoes strategic analysis standpoint, so that this project can be used to help in developing a strategic plan. Also, they may strategically analyze different industry that uses 3D printing technology.

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# 14. Appendix

## a. Survey

### 3D printing Survey

3D printing technology is a process where solid objects can be made from a digital file. This process is done by a printer laying down successive layers of material until the object has been completely made. The digital file is made either by the use of a 3D scanner, which makes a copy of the existing object or through the use of a virtual design software program such as CAD (Computer Aided Design). There are different methods used in order for these printer to create the physical object. Some of the most common methods include melting or softening material to create the layers, there is also the selective laser sintering (SLS) and the fused deposition modeling (FDM). using liquid materials is also an option; the most popular technique in this case is called stereolithography (SLA).

* Required

**Have you heard about 3D printing technology? ***

- ◯ No
- ◯ Yes

**Do you like the idea that 3D printing can create a design that adapts specifically to you? ***

- ◯ No
- ◯ Yes

**Would you purchase a clothing or footwear items made by a 3D printer? ***

- ◯ No
- ◯ Yes

**In relation to the previous question, Why? ***

- ◯ Value
- ◯ Customization
- ◯ Quality
- ◯ Innovation
- ◯ Time efficiency

**Do you consider your foot type when you are shopping for athletic shoes? ***

- ◯ No
- ◯ Yes

**Would you pay more or less for a 3D printed manufactured item vs a regular manufactured item? ***

- ◯ More
- ◯ Less

**Where do you prefer to purchase your footwear?** *

- ◯ Store
- ◯ Online

**How often have you use Internet to buy new shoes?** *

- ◯ Always
- ◯ Often
- ◯ Sometimes
- ◯ Rarely
- ◯ Never

**Do you have brand preference or loyalty?** *

- ◯ No
- ◯ Yes

**When buying sportswear, what are the top three factors?** *

- ☐ Quality
- ☐ Price
- ☐ Innovative design
- ☐ feel/comfort
- ☐ Customization
- ☐ Color
- ☐ Brand

**How long does it take to find best athletic shoes for you?** *

- ◯ <15 min
- ◯ 15 - 30 min
- ◯ 31 - 45 min
- ◯ 46 - 60 min
- ◯ >61 min

Submit

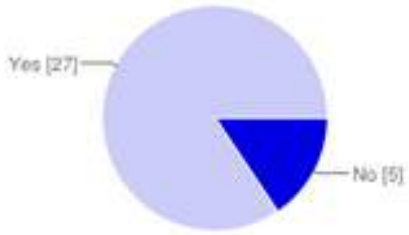
b. Summary of Survey Responses

# 32 responses

View all responses  Publish analytics

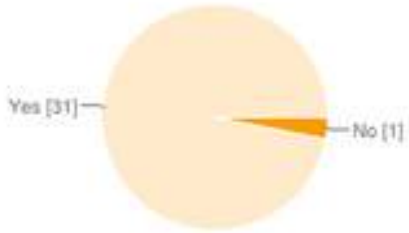
## Summary

**Have you heard about 3D printing technology?**



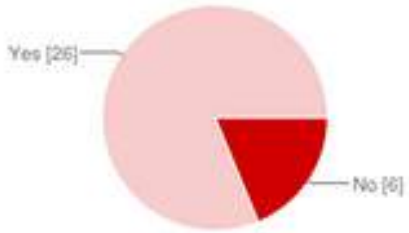

| | | |
|---|---|---|
| No | 5 | 16% |
| Yes | 27 | 84% |

**Do you like the idea that 3D printing can create a design that adapts specifically to you?**




| | | |
|---|---|---|
| No | 1 | 3% |
| Yes | 31 | 97% |

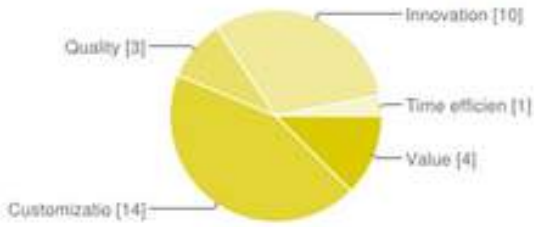
**Would you purchase a clothing or footwear items made by a 3D printer?**




| | | |
|---|---|---|
| No | 6 | 19% |
| Yes | 26 | 81% |

**In relation to the previous question, Why?**

**In relation to the previous question, Why?**

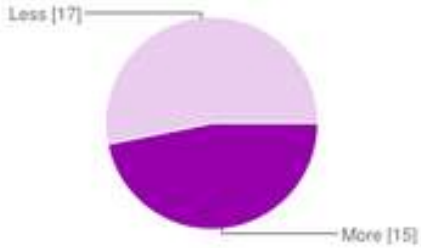



| | | |
|---|---|---|
| Value | **4** | 13% |
| Customization | **14** | 44% |
| Quality | **3** | 9% |
| Innovation | **10** | 31% |
| Time efficiency | **1** | 3% |

**Do you consider your foot type when you are shopping for athletic shoes?**

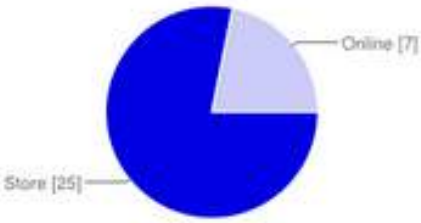

| | | |
|---|---|---|
| No | **10** | 31% |
| Yes | **22** | 69% |

**Would you pay more or less for a 3D printed manufactured item vs a regular manufactured item?**



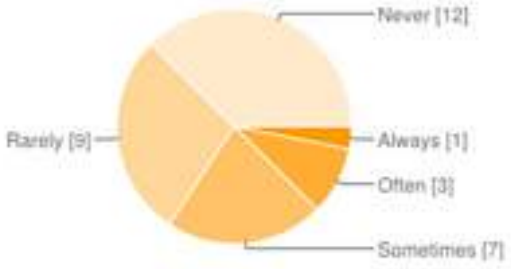

| | | |
|---|---|---|
| More | **15** | 47% |
| Less | **17** | 53% |

**Where do you prefer to purchase your footwear?**



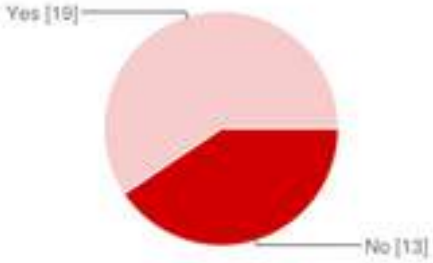

| | | |
|---|---|---|
| Store | **25** | 78% |
| Online | **7** | 22% |

**How often have you use Internet to buy new shoes?**



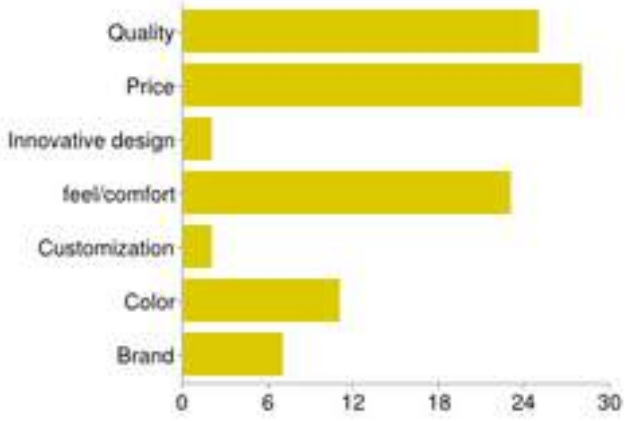

| | | |
|---|---|---|
| Always | 1 | 3% |
| Often | 3 | 9% |
| Sometimes | 7 | 22% |
| Rarely | 9 | 28% |
| Never | 12 | 38% |

**Do you have brand preference or loyalty?**



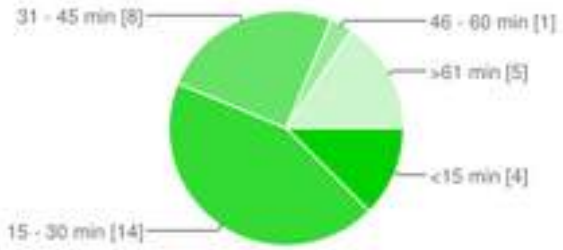

| | | |
|---|---|---|
| No | 13 | 41% |
| Yes | 19 | 59% |

**When buying sportswear, what are the top three factors?**




| | | |
|---|---|---|
| Quality | 25 | 78% |
| Price | 28 | 88% |
| Innovative design | 2 | 6% |
| feel/comfort | 23 | 72% |
| Customization | 2 | 6% |
| Color | 11 | 34% |
| Brand | 7 | 22% |

**How long does it take to find best athletic shoes for you?**




| | | |
|---|---|---|
| <15 min | 4 | 13% |
| 15 - 30 min | 14 | 44% |
| 31 - 45 min | 8 | 25% |
| 46 - 60 min | 1 | 3% |
| >61 min | 5 | 16% |

**C. Porter's Five Forces Checklist.**

| | | |
|---|---|---|
| **1- The Threat of Entry … (High)** | | |
| 1 | Does the industry have small production scale? | ☑ |
| 2 | Does the industry have small research scale? | |
| 3 | Does the industry have small marketing scale? | ☑ |
| 4 | Is there identifiable brand in the market? | |
| 5 | Has the company not need to invest heavily in capital requirement? | ☑ |
| 6 | Does new company able to create, produce, acquire, transport or distribute goods to customers at rates equal to or better than competitors? | ☑ |
| 7 | Does the industry have no limitations in terms of distribution channels? | ☑ |
| 8 | The government does not impose strict policies for the industry? | ☑ |
| 9 | Do the new comers expect a strong competition from the existence competitors? | |
| **2- The Power of Suppliers… (Low)** | | |
| 1 | Is the number of suppliers limited now? | ☑ |
| 2 | Is the number of suppliers limited now for the future? | |
| 3 | Are basic material/labors/services differentiate | |
| 4 | Is the industry not important customer to the suppliers? | |
| 5 | Are the suppliers interesting to be part of the industry? | |
| 6 | Are the companies not able to switch between suppliers easily? | ☑ |
| **3- The Power of Buyers… (Low)** | | |
| 1 | Is the industry concentrate on limited number of customers? | |
| 2 | Are the targeted customers are very sensitive to price of the product? | ☑ |
| 3 | Can the industry has a heavy-volume buyers | |

| | | |
|---|---|---|
| 4 | Is it hard to attract customers to buy the products even with incentives? | |
| 5 | Do the customers need a lot of instruction in how to use the product? | |
| 6 | Could the customers manufacturing the products from their homes in the near future | ☑ |
| 7 | Are the customers hardly switching between suppliers in terms of cost? | ☑ |
| 8 | Could customers manufacturing the products from their homes currently? | |
| **3- The Threat of Substitutes… (High)** | | |
| 1 | Are there available substitute products in the market? | ☑ |
| 2 | Is the substitutes price less than the company's products? | ☑ |
| 3 | Are the customers willing to switch to substitutes? | ☑ |
| 4 | Are the substitutes better in quality? | |
| 5 | Are the suppliers interesting to be part of the industry? | |
| 6 | Are substitutes easier to obtain? | ☑ |
| **3- The Threat of Competitors… (High)** | | |
| 1 | Would the customers pay less money if they switch to competitors? | ☑ |
| 2 | Is the industry growing slowly | |
| 3 | Are there many commitments that prohibits the company getting out from the industry? | |
| 4 | Is there large number of competitors in the market | |
| 5 | Do the competitors have a good reputation among customers and suppliers? | ☑ |
| 6 | Are the majority of the customers loyal to some brands? | ☑ |
| 7 | Are the firms in the industry suffering from overcapacity? | |
| 8 | Are there products differentiate in the industry? | ☑ |
| 9 | Are competitors to pay a large amount of money to do R&D, to provide offers to gain customers trust? | ☑ |