

**StrikeFit: Soft Electronics
and Wearables Shoe-Insole**

by
Mohammad Ali
Christopher Holliday
Ming Li
Mengqi Wang
Nitigarn Siripanich

Technology-Based Product Innovation and Enterprise Creation
96-717

12/5/14

Introduction to StrikeFit

Imagine having a \$264 billion problem each year and this number being equal to 9% of total your total sales.¹ This haunting number impacts retailers each year due to consumer returns. The \$48 billion² Footwear industry is one of the main retail categories affected by consumer returns and experiences an average of 1 return for every 10 shoe bought. This translates to an absorbed cost of \$4.8 billion each year (**Appendix A**). Some of the major reasons behind footwear returns are due to customer misunderstanding issues, which include size, fit and comfort. Each brand of shoe sold has a unique fit and although customers might believe that their respective size in one brand translates to the same size in another brand, this is usually not the case.

A recent study from the Institute for Preventive Foot Health found that 78 percent of adults had experienced foot trouble at one time or another. Often the source of the problem is improperly fitting shoes. According to Consumer Reports, one study that actually measured people's feet revealed that more than a third were wearing shoes that were either a half size too large or small; 12 percent were off by 1½ sizes or more. Another alarming study of older individuals conducted by the American Orthopaedic Foot and Ankle Society concluded that 8 in 10 were wearing shoes that were too narrow, and 7 in 10 women develop bunions, hammertoes, or other foot deformities from their ill-fitting footwear.³

To mitigate this pain faced by Footwear consumers, we developed the StrikeFit Insole. The shoe-insert insole has an integrated pressure mapping sensor (patented by CMU Professor Dr. Carmel Majidi) that contours to the foot and detects the ideal size, width, arch and comfort-level based on the consumers movement. The movements of the consumers foot are captured on the various sensors spread out within the insole and transmitted via bluetooth to the StrikeFit App, where the consumer can view a customized report that details the analysis of their foot and the recommended shoe for the activity they wish to perform. We believe the StrikeFit Insole will empower consumers to make well-informed decisions when it comes to the health of their feet and help alleviate the cost of returns incurred by footwear retailers due to incorrect shoe selection by consumer.

Product and Technology Overview

The StrikeFit is a Bluetooth enabled wearable shoe insole insert that monitors the users footstrike through a pressure activated patented sensor technology.

¹ <http://www.usatoday.com/story/money/business/2013/08/12/retailers-tracking-customers-returns/2642607/>

² <http://www.statisticbrain.com/footwear-industry-statistics/>

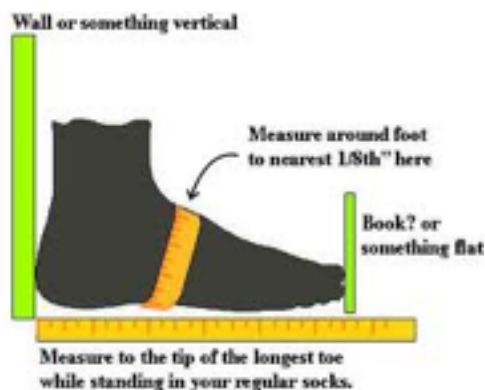
³ <http://www.consumerreports.org/cro/2014/01/don-t-let-stylish-shoes-give-you-unhappy-feet/index.htm>

The sensor technology behind the StrikeFit insole are laser-patterned liquid indium-gallium circuits, which are embedded between layers of insulating polymers. This brand new technique for making soft and flexible circuits, which has been patented by Carnegie Mellon's Soft Machine Labs, creates an opportunity to apply this technology to shoes through a padded sensor insert. In order to create the StrikeFit shoe insole insert, two identical liquid metal circuits are embedded in a flexible polymer, separated by a thin layer of polymer. The space between the circuits creates numerous capacitors. When attached to the appropriate measurement devices, small compressions in the material between the capacitors creates a change in capacitance, which can be measured and converted into a measurement of displacement, force or pressure. These measurements will be transmitted via Bluetooth, in real time, to the StrikeFit app synced to the StrikeFit insole.



Figure 1. StrikeFit Exploded View

The app will store this data and create a heat map of the user's pressure patterns and a detailed analysis of the users foot requirements. Some of these requirements include:



Width

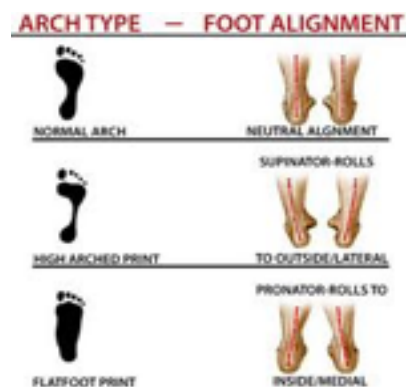


Figure 2. Size: Length

Figure 3. Arch Type/Foot Alignment

and

The user will receive an informational description of their running or walking ergonomics, as well as a recommendation for the type of shoe and/or corrective insert they should purchase. Recommendations will be sourced from an internal database that houses various foot measurement details and matched off against the users foot analysis results. In order to provide

a variety of options, the recommendations will be compared to a database of information about existing shoe models and brands, allowing for a personalized shoe recommendation that suits the customers needs. This database will potentially be populated by information from original shoe manufacturers, who will be able pay a premium to give their brand priority when it is matched with a recommendation. Additionally, the database could include fitting information from Shoefitr, a company that analyzes the geometry of shoes to provide a fit comparisons between models and brands.

To give users confidence about our recommendations before going to market, we will hire a series of podiatrists and have them analyze the results collected from monitoring athlete from in various sports using the StrikeFit insole. This testing will also allow for stress testing the durability of the insole after rigorous use and the strains on the sensor itself. The subjects of the research will then be outfitted with the ideal shoe and/or insole using conventional fitting techniques, and the resulting recommendation will be tested to ensure the subject has the perfect foot comfort system. The resulting recommendation will then be associated with the pressure map of their foot, and used to create a comprehensive guide to fit and comfort recommendations based on data collected using our insoles.

StrikeFit Business Model

The insole will be sold to B2B customers through www.mystrikefit.com. These B2B customers will include Footwear Retailers, Division II/III University Sport Teams and Speciality Retailers (Assisted Living & Maternity). We have chosen to focus on these B2B customers due to the unique challenges they face in regards to footwear. Retailers as described above are losing billion of dollars due to customer returns from their misunderstanding of their correct shoe size. Division II/III University Sport Teams lack the financial resources to hire expert physicians to monitor athlete foot strike and buy expensive equipment for custom shoe-fittings. Assisted Living and Maternity customers are our transitional customers, whose shoe sizes fluctuate as their body structures change and therefore lack the knowledge to pick the right shoe for their current situation.

The website will serve as a strong complement to the business marketing efforts, which includes trade shows, in-person sales visits and social media advertising. These various marketing efforts will direct potential customers to the StrikeFit website. The website will serve as an educational and sales portal. By providing detailed information about the professional and customer testimonials and an easy to use ordering process on the website, we look to grow the customer base of StrikeFit. The StrikeFit app will be a substitute for the website and give B2B customers flexibility of ordering our products. Customer service support will be a value-proposition that we will be emphasised in our interactions with our customers. We also have an B2C opportunity if customers would like to view a customized report that details the analysis of their foot and the recommended shoe for the activity they wish to perform. They can also contact us through our enterprise portal website.



Figure 4: Company Website

The Strikefit will be sold as a bundle package, which will include 30 sensor shoe insoles and an Apple iPad. The two packages available for sale will be for adults and kids. Each package will include 30 insoles, which will cover both gender sizes and extra insoles for more common sizes. Each package is estimated to be sold for \$1750 and will come with a 30 day return policy* (depending on test results). The iPad will come pre-loaded with the StrikeFit app and instructions on how to get started, syncing retailer inventory to recommendations, customer foot-monitoring instructions and a customer support button for direct connection to a rep.

The retailer will be able to connect their customers directly to the StrikeFit app by having them type in their e-mail address on the iPad screen (Figure 5). Once an account is created, a QR code printed on the appropriate sized insole will be scanned using the camera on the tablet to sync the device to the insole via Bluetooth. The customer will insert the device into their current shoe and activate the sensors in the insole through performing various foot movements (walking, jumping). These movements will be captured and displayed simultaneously on the iPad as the customer is performing their movements. Upon completion the sales rep will inform the customer about their foot-monitoring results and the recommended shoe for their intended activity in their current inventory. Customers can choose to buy it in the physical store or purchase it online.

These results will also be available to customers, when they login to the app on their respective technology devices. To promote a young and sporty brand image our focus is to create the app aesthetically pleasing through the use of red, blue and plum colors to make it easy to navigate through the various screens, the app will incorporate swiping technology.

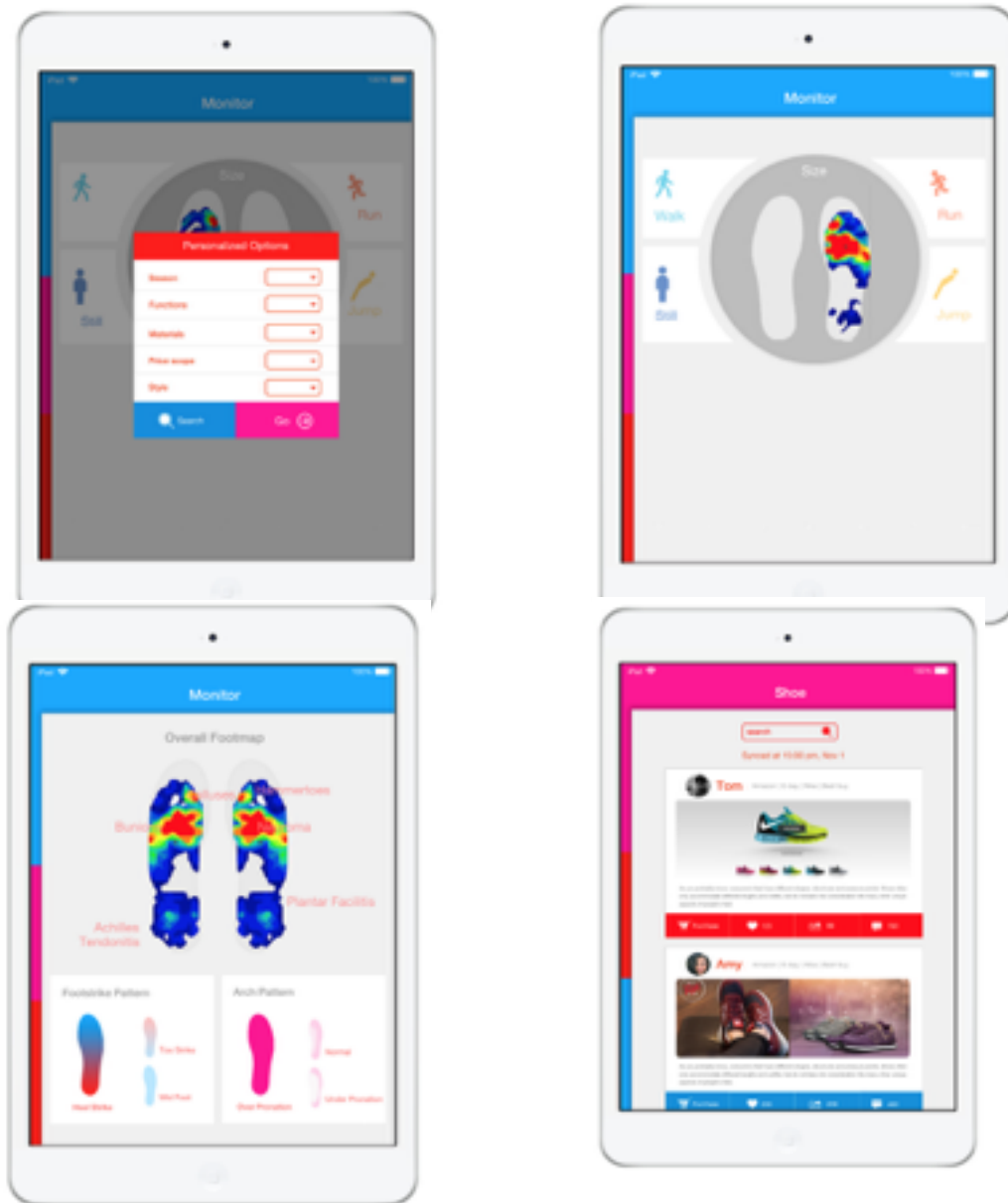


Figure 5. Tablet Application Interface

Customer Persona

Below we have described two personas we have created based on the interviews we conducted and are representative of our target customers.



PROFILE #1

Name: Mary

Age: 35 years old

Occupation: Designer

"There are many times when I tried a pair of shoes in store and they would fit right, but when I actually bought and wear them I found out that they are too tight or too big"

Her name is Mary loves buying new shoes. As a designer she cares a lot about shoes that are trendy and comfortable. She has a hard time finding shoes that fits her and as well meet her taste on design. What makes things even more difficult for her is she

has a wide foot, which becomes a problem when looking for shoes that are both comfortable and fashionable.

Even though she finds it is difficult to find perfect shoes, her biggest challenge is prolonging the comfort of her shoes. This occurs when she has tries on the shoe at a retailer and it fits perfectly, but after she gets home and after wearing them for a prolonged period of time, the shoes start to feel uncomfortable. This forces her to waste more time by having her return the item and look for new shoes to buy. She wishes there was a service that can solve this shoe fitting issue for her through personalized recommendations, which she would be happy to pay extra money for.

Profile Summary

Shoe Preference

- High heels, leather shoes

Shopping Behavior

- Mostly buy in store, seldom buy online

Goal

- Finding shoes that fits well.
- Finding shoes that look good.

Questions

- Why don't good looking shoes fit well?
- Why I am a different size for each shoe brand?
- Why isn't there a customize shoe fitter in every store?

Frustrations & Pain Point Insights

- Good looking shoes(especially high heels) are not comfortable to wear.
- Sometimes shoes doesn't fit well after you bought them
- Size differently for different brand
- Have wide feet hard to find one that fits well
- Have to buy online as they sometime don't have the half size.



PROFILE #2

Name: Tom

Age: 22 years old

Occupation: Student/Athlete

"Most of my time is spent practicing on the field, but my record hasn't improved. Moreover, my right knee is starting to hurt. What an awful year!"

Tom is a track & field athlete at a Division II university. He didn't do very well during this year's tournament, and has suffered from back pain. He doesn't know what the cause of this recent pain stems from, but he speculates it might be caused by his new running shoes, due to the pain started a little later after he started using them. He decided to go back to Dick Sports, where he had purchased these new running shoes because they did not supply suitable support for his unique foot structure. He tried to consult his coach about his recent condition, but since the University doesn't allocate enough funding to the track & field team, they could not afford to hire a professional sport physician to analyze his foot.

With limited options, his coach referred him to a professional sporting goods store all the way across town, where he could get his feet analyzed. When he got to the store he was greeted by a salesperson, who asked him some basic questions about his daily activities and routines, asked him to walk and run on the treadmill, then she recommended a pair of shoes that would be suitable for his gaits and foot shape through her training experience. Unfortunately, the salesperson that helped him was new to the store and she is not very experienced, so although the shoes that she recommended for him only helped him with the back pain it did not take into consideration mitigating other pains that might arise

Profile Summary

Shoes Preference

- Running shoes

Shopping Behavior

- Buys shoes in store

Goal

- Finding shoes that helps reduce back pain
- Finding shoes that are suitable for his feet and his training needs

Questions

- What is the cause of my back pain?
- Why are these new shoes hurting my feet?
- Why is it so hard to find a professional sporting goods stores that recommends shoes?

Frustrations & Pain Points

- Buying many pairs of shoes but still fail to find one that actually suitable and fit well
- Having to travel to so many places to buy a pair of shoes
- Never know side-effects that foul fitting shoes could cause to the body

- The university does not have enough fundings for the track & field team to hire a professional sport physician

Differentiator Factor

What makes the StrikeFit Insole unique is its ability to personalize footwear recommendations for each consumer through wearable soft sensor technology. Gone are those days where consumers suffer from foot injuries from wearing the wrong shoes, and long gone the age where only a few high market consumers can enjoy personalized services. StrikeFit would offer the mass market consumers the chance to find a shoes that is truly compatible for every one of their lifestyle needs. Also, most existing footwear recommendations technologies available in the mass market usually consist of stationary pressure pad, where consumers can stand on and get their feet pressure mapping analyzed. However, these services are actually no different from simply trying on a pair of shoes and see how they feel standing in them. Whereas with StrikeFit, using Carnegie Mellon University's soft sensor technology, we could provide more in depth details and analyze how your feet are performing while you actually are walking and running. This in turn would provide a far more accurate shoes recommendations for each specific consumers.

Financial Assessment

The financially feasibility of our business model looks promising. The target US Market size for our product is 61,000⁴ and we believe we can capture 7% of that in our first year in regards to units shipped.

Customers	Current Size	Estimated %	Estimated Packages Shipped (Year 1)
Retailers	30,000	5%	1,500
Division 2	300	10%	30
Division 3	350	10%	35
Assisted Living Seniors (65-75)	30,000	10%	3,000
TOTAL Market:			4,565

The cost to produce a pair of the StrikeFit Insole is \$30.41 (Table1).

Variable Cost Estimation			
Item	Unit Cost	Amount	Cost

⁴ <http://www.sbdcn.net.org/small-business-research-reports/assisted-living-facilities>
<http://www.cdc.gov/nchs/fastats/births.htm>
<http://www.athleticscholarships.net/division-3-colleges-schools.htm>

EGaIn	\$0.62925/g	5g	\$3.15
Silicone Rubber	\$12.50/kg	0.9kg	\$11.26
Bluetooth Transmitter	\$4/unit	2	\$8.00
Microcontroller	\$2/unit	2	\$4.00
Battery	\$1/unit	2	\$2.00
Charging Module	\$1/unit	2	\$2.00
Total Cost per Pair		\$30.41	

Note: Many of these cost estimations are based on prices for smaller quantities. The variable cost once scaled should drop significantly.

Table 1. Estimation of the Variable Costs

Taking these cost into account with Fixed Cost of \$400k, which includes R&D, Plant & Equipment, SG&A and Labor, we expect a 5-year valuation of \$40M based on a Gross Profit of 50%. This valuation is using a conservative growth rate for our customer base and not adjusting for the reduction of our variable cost due to R&D investment and economies of scale. Our expected market share in this space is expected to be 17%. We look to grow this market share through increasing our product mix by getting into the custom shoe business and selling to customers directly through mail-in shoe insert trials.

\$ in MM's	Dec-15	Dec-16	Dec-17	Dec-18	Dec-19	Dec-20
<u>Income Statement</u>						
Users		4,500	5,625	7,031	8,438	10,125
Net Revenue	\$ -	\$ 7.8	\$ 11.7	\$ 17.6	\$ 22.8	\$ 29.7
Growth %		N/A	50.0%	50.0%	30.0%	30.0%
Cost of Sales	0.5	(3.9)	(5.9)	(8.8)	(11.4)	(14.8)
Gross Profit	\$ (0.5)	\$ 3.9	\$ 5.9	\$ 8.8	\$ 11.4	\$ 14.8
Margin %	N/A	50.0%	50.0%	50.0%	50.0%	50.0%
SG&A:	0.3	(1.6)	(2.3)	(3.5)	(4.6)	(5.9)
EBITDA	\$ (0.8)	\$ 2.3	\$ 3.5	\$ 5.3	\$ 6.8	\$ 8.9
Margin %	N/A	30.0%	30.0%	30.0%	30.0%	30.0%
Valuation Multiple:					4.5x	
Implied Valuation:					\$40.0MM	

Product Research and Development

Phase I Evolution

Originally our project was focused on creating OEM sensors for other companies for the various products they sold. We quickly realized this was not a feasible business model because it was not scalable to service all industries. After going back to the drawing table we decided to go

back to our original idea of wearables shoe inserts and worked on differentiating our product by surveying the market. Through competitor analysis, customer surveys and actual in store experience, we came to the conclusion that getting into the unserved B2B market related to shoe-fitting. The Set Factors below were used to understand the wearables market and the opportunity it presented.

Set Factors

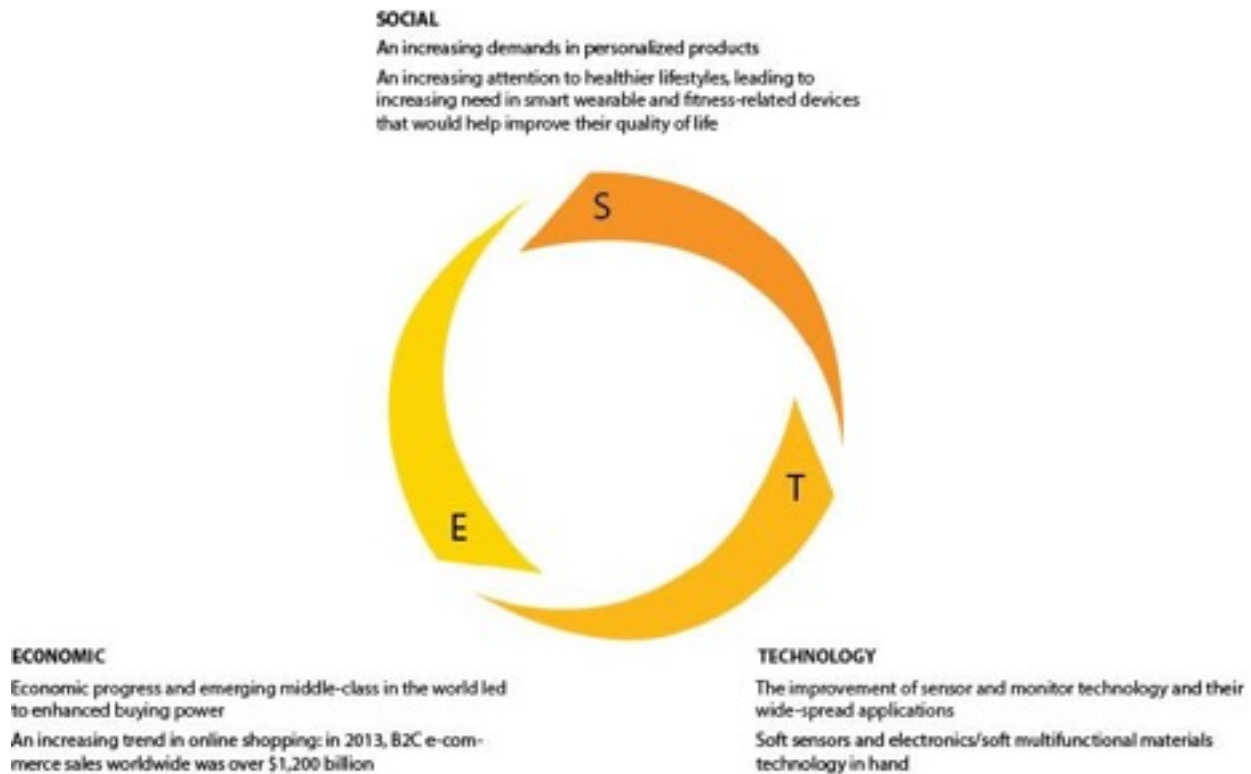


Figure 5. Set Factors

Industry Trends

Nowadays, as the development of technology is becoming faster and faster, more new technologies around wearable are coming to market everyday. As you walk on the street you can see everybody holding iPhones, using an iPad, and computers, which people could hardly imagine 10 to 20 years ago. As the trend continues, people are getting more exposure to new technologies and more willing to accept them into their everyday lives, as we can see with the recent trend of people using 3D printers to print out gifts for friends.

As the high-tech commerce is emerging, people are getting interested in tailored information about themselves, and available to them through different applications. For instance, you can record your heart rate during workouts or throughout your entire day, not only when you are being examined in the hospital. As people get more data, they get to know more about themselves, and they are growing to love and trust recommendations based on data, rather than the recommendations of professional people. Since people no longer want to rely on others, they want to make decisions for themselves and get control of their own lives. The world of synced devices and wearable technology will start to mainstream, as trusted retailers and manufacturers move in to the market and convert consumer appetite into action, the report found.

According to Mintel, consumers are already thinking about how their devices sync as part of their research and purchasing process. Some 41% of UK smartphone and/or tablet owners claim they are more likely to buy a laptop or desktop computer that uses the same operating system as their tablet and/or smartphone and the same number (40%) agree that it is important that their smartphone and tablet use the same operating system.

In terms of wearable technology, Cope notes: "Apple and Google are introducing ecosystems to compete for leadership in the wearables and connected home market and retailers are also pushing synced devices. It's important to consider that smart devices needn't be about health or home economics - they can be about aesthetics and ambience as well ." While wearables have already been adopted by consumers to a degree, Mintel believes the potential is far greater. The report reveals that one in five (21%) UK adults already use either a wearable device or a health-related mobile app. And while smart clothing that monitors health and performance has previously been the domain of niche brands and startups - the launch of Ralph Lauren's Polo Tech Shirt will launch this concept into the mainstream.

"We're going to see more attractive, appealing, fashionable takes on wearables. These devices are as much about signaling status as number-crunching and the ante needs to be upped in this department if consumers truly want to be seen with them," Cope says.

Stakeholder Research

Through the survey we launched, we found **25 out of 39** said they usually buy shoes in stores. Although most of the people said they have never used a shoe accessory to improve fit or comfort. Their answer to the survey shows that **36 out of 39** people represent **92%** of the interviewee would like to try the service if provided for free. This gave us added confidence in addressing the customer pain of finding the right shoe for their needs.

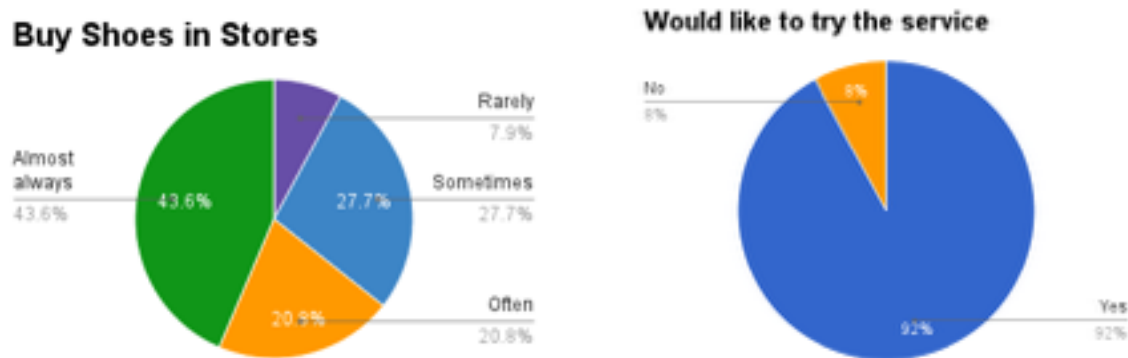


Figure 6. Survey Results

We decided to experience current shoe fitting experience our selves and found that StrikeFit competitive edge was its informative and detailed analysis of the users foot and personalized recommendations for their unique lifestyle. Below you will find three scenarios of our customer experience related to shoe-fitting

Scenario 1: New Balance



Figure 6. Recordings of New Balance's Fitting Process

We went to the New Balance retail store, to test their foot fitting machine. You had to take off your shoes and stand on the machine first, then the saleswomen came over helped you use the machine. After standing on the machine for 6 mins, it collected our foot data, the saleswomen then went through the results and diagnoses. Finally, she gave us recommendations on the type of shoe or insoles that was needed.

Scenario 2: Dr. Scholl's

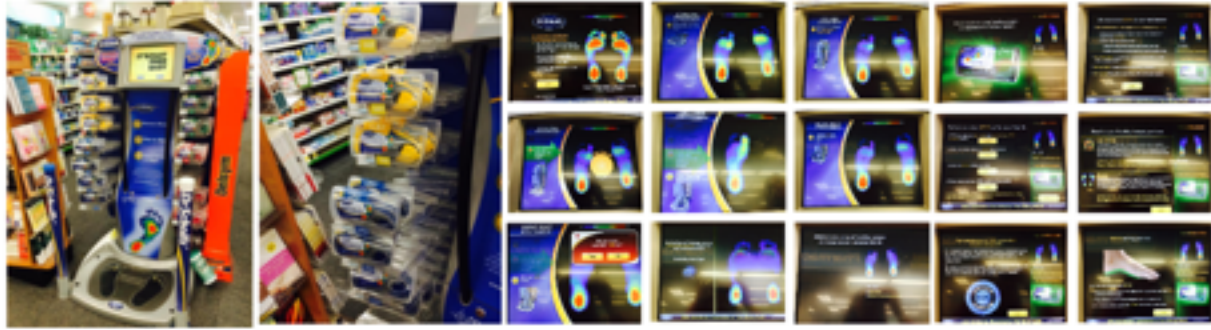


Figure 7. Recordings of Dr.Scholl's Fitting Process

The Dr. Scholl's foot pressure machine in CVS was a different experience from New Balance. There was no one there to help us with using the machine and required one to learn the instructions on the fly. Similar to the New Balance store, you had to take off your shoes and stand on the machine, but this time the machine asked you to lean in different direction to measure different pressure have been given to your foot. After all that, it displayed the results of your foot mapping and pressure, along with recommendations of the type of insole to buy to make the improvements you are looking for.

Scenario 3: TrueRunner



Figure 8. Recordings of TrueRunner's Fitting Process

TrueRunner is a specialized sporting goods store, which offers professional consultation on shoe fittings. The followings are the process of how shoe fitting is done in a TrueRunner store:

- Step 1 :** Consultation - general Q&A - what shoes you currently use, any injury etc.
- Step 2 :** Walk and see the arch
- Step 3 :** Running barefoot on the treadmill, the salesperson take VDO of the customer running (approx. 1 min)
- Step 4 :** Show the video while analyzing and explaining to the customer, and recommend shoes and explain why

TrueRunner also has a Aetrex - "always broken, we don't like to use it"
 Nike testing lab - athlete run - pressure mapping - most athlete put most pressure on forefoot. Depend on the employee recommending the shoe, your experience will vary . If they're good at fitting you won't need any gadget. It would be helpful. We found the aetrex improperly match the insole to the foot. They only use it to look at the pressure points."

Insights

- i. People may feel pretty awkward to take off shoes in public.
- ii. Machine can break down, and customers will wait for a long time until it fixed.

- iii. Short time test may lead to inaccurate data and analysis.
- iv. People may have less access to this service due to less machine.
- v. When the result comes out they only give you the suggestions but not the reasons.
- vi. The data is too much and not clear enough, people may get confused several times using it
- vii. It takes about 15 mins to finish too long for people who is busy.
- viii. Places that don't have trained employees may be a good market for us, like Dick's or Footlocker.

Competitive Landscape

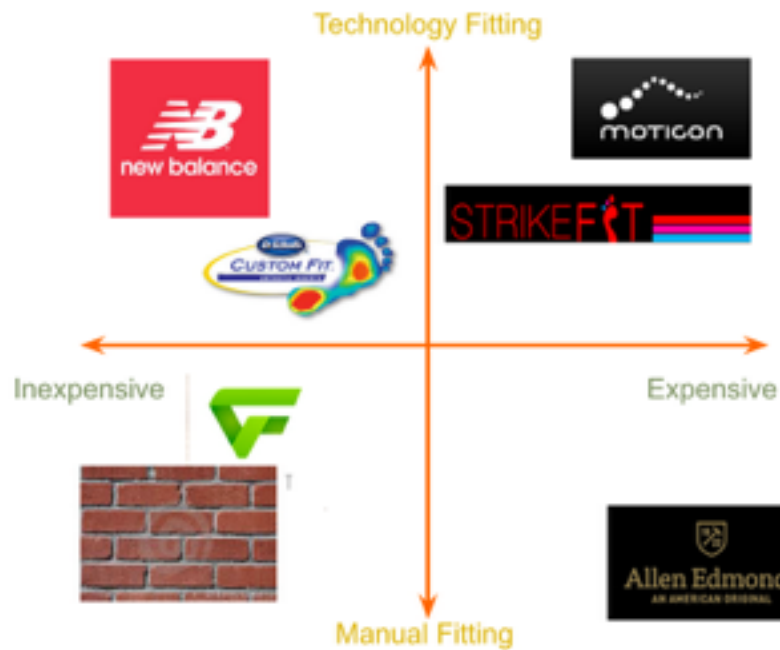


Figure 9. Competitive Landscape Chart

Smart product and personalization is not a new trend within the shoe industry, however, there is still a big gap in the market for a new business to endeavour. Now more than ever, people prefer to rely on data and technology rather than human input. This leaves an opportunity for a high tech personalized shoe fitting service, that provides recommendations based on data rather than human interpretation. In order to find an opportunity gap within the market, we have created a competitive landscape chart. Our competitors in the markets are New Balance, Dr. Scholl's, Moticon, Brick and mortar stores, and Allen Edmonds etc.

We compare these competitors in term of their pricing strategies and their fitting methods, then we determine where the opportunity gap is for us. Using this chart, we found that our opportunity gap is a medium price market using a high tech fitting method. While our main competitor is aiming for higher price with use of technology and has a B2C business model, we will be focusing on the B2B business model by partnering up with big shoe retailer stores such as Foot Locker or Dick's and aiming to provide our service through them to the mass market consumers. There are several apps out there, like VFit, but they do not focus on giving the

customer a holistic analysis of the foot, but instead has the user take a picture of their foot and then the scans this photo to recommend the ideal fit.

From our questionnaires and interviews, we found out that people mainly buy shoes from brick and mortar stores, as they would like to put on the shoes and try them out. However, as online shopping is becoming more and more popular, there is also an opportunity gap in the online shopping segment that we can emerge into later on after we have established ourselves in the existing market and gaining consumers' trusts.

VOA Criteria and Results

Using our survey results we conducted a Value Opportunity Analysis to compare the B2B application of the StikeFit insole to the fitting services provided in stores. We did an analysis on the B2C potential market for fitting recommendations through online retailers.

VOA of Current In Store Shoe Fitting Service

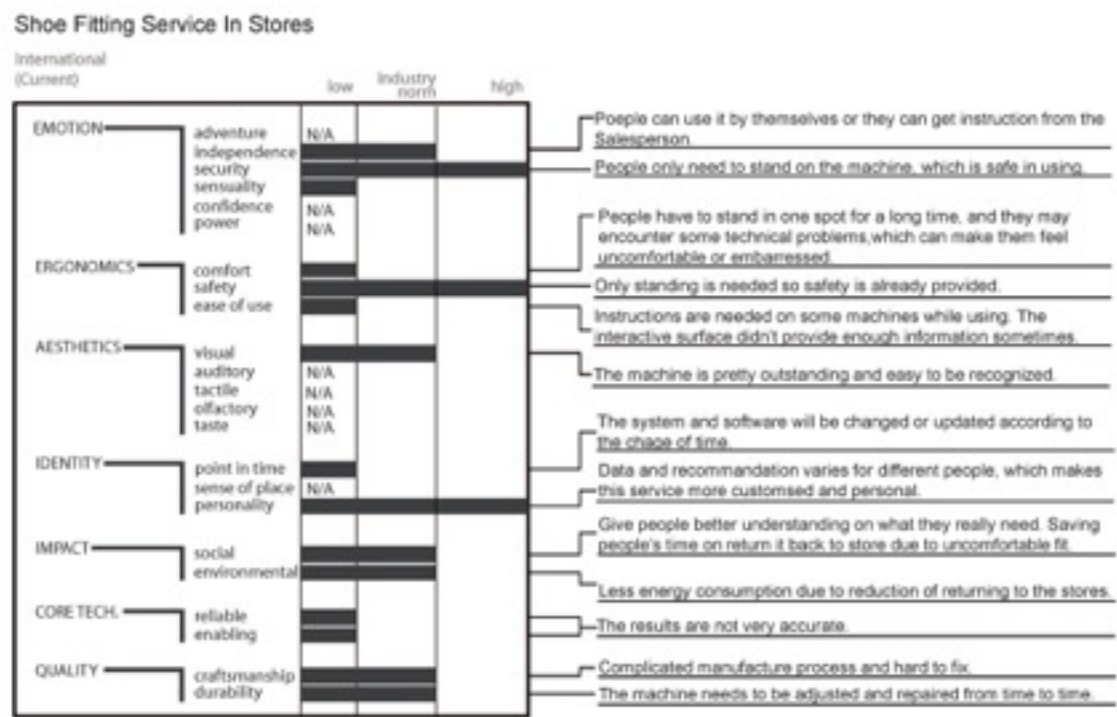


Figure 10. VOA of Current Shoe Fitting Service in Stores

VOA of StrikeFit Service In Stores and Online

Shoe Fitting Service In Stores

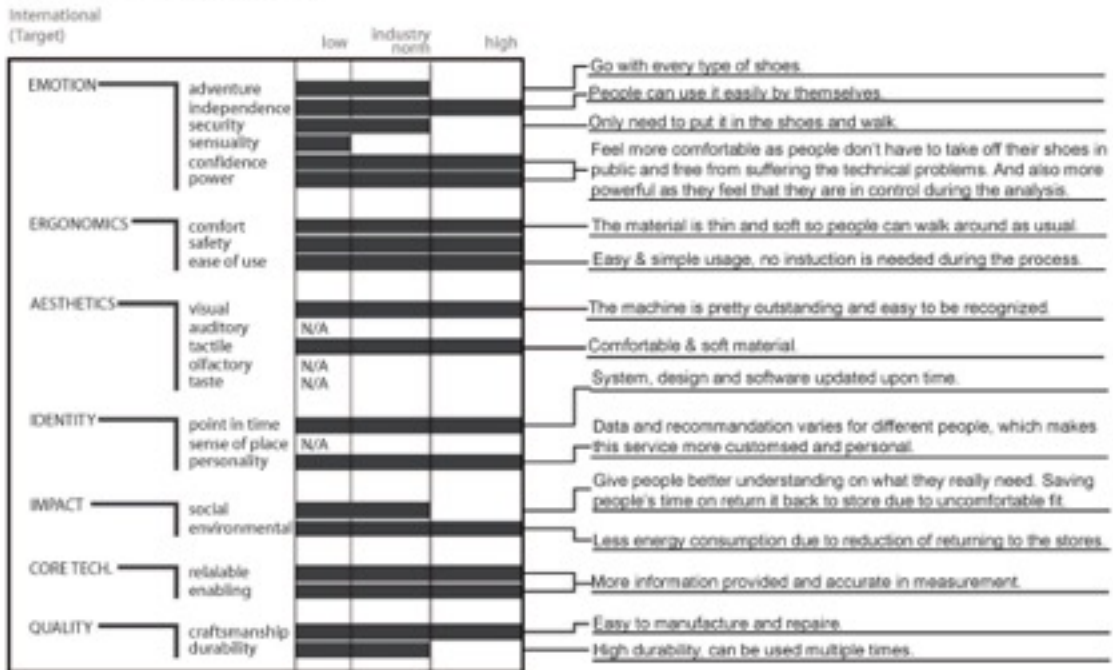


Figure 11. VOA of Target Shoe Fitting Service in Stores

Shoe Fitting Service Online

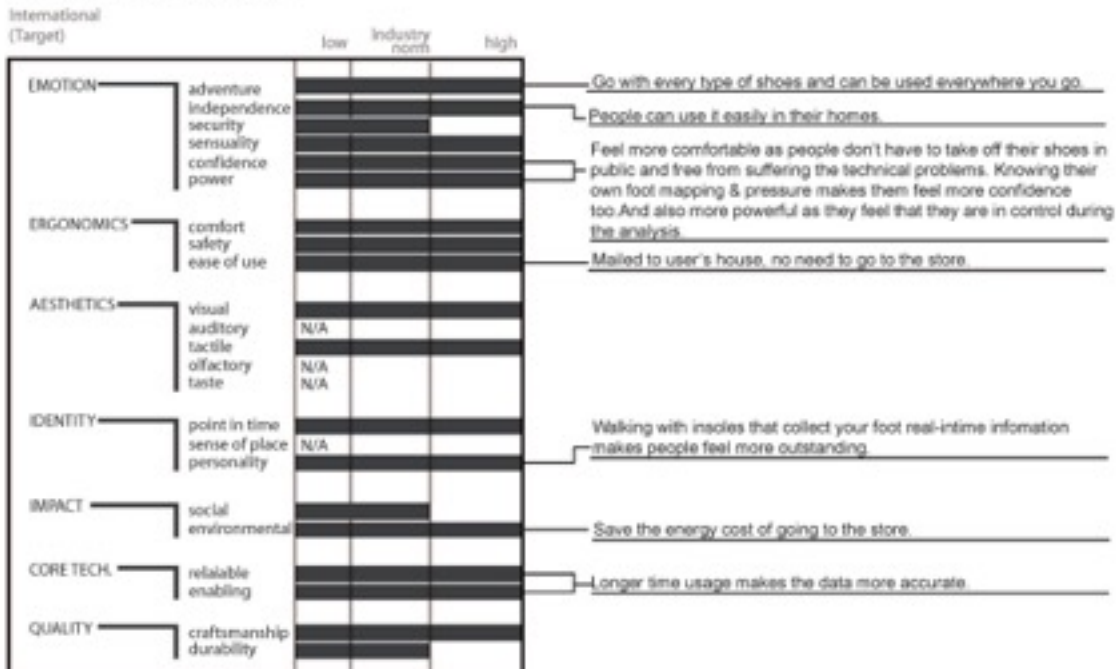


Figure 12. VOA of Target Shoe Fitting Service Online

Go to Market Strategy

In order to successfully establish StrikeFit as a business, we will need to create a strong user interface and a functional product. We will also need to demonstrate a strong user need for our product to take to our potential customers. What needs to be accomplished in order to achieve this can be broken down into the following :

- The creation of a website and app that promote the use of our product as well as allow untrained customers to use our product without confusion, including a comprehensive database of shoes and their uses to compare with recommendations.
- Robust and functional insole that provides consistent data over long periods of use.
- Well researched fitting recommendations based on cross-referencing of insole data with professional fitting recommendations.
- Demonstrable proof of user need.

The following is a breakdown of the finances necessary to complete these tasks.

Website Development

Basic Website Components and Costs

- Domain Name – \$10/year
- Hosting – \$10 to \$100 a year (depending on traffic and hosting services)
- Web Planning, Design and Development Time – 60 hours and up
- Continued Website Maintenance – \$500 a year and up (depending on number/type of updates required)
- Marketing Your Website Online – \$750 a month and up

Development and launch costs range from **\$6,000 to \$20,000**, with allocations of 15% to Planning, 25% to Interface design, 40% to Programming, and 20% to Project Management.

Mobile App Development

Our Mobile app has following features,

- IOS platform
- Log in through social media (Facebook, twitter.etc)
- Customer need to create personal profiles
- App need to connect with our website
- Beautiful interface and icon
- Backstage database for recommendation

Mobile service has become critical to online success. Design should be at the very least mobile-friendly. The best designs are “responsive,” which means they automatically adjust their layout

to look good and function easily on multiple devices including smartphones, tablets, and desktop/laptop computers.⁵

Our mobile app will require a database of the geometry of different shoe models to reference when making fit recommendations. Database design projects are typically priced by the hour, with rates ranging from \$50 to \$220 per hour. The largest part of this cost is time and labor. A small database can take 50 to 100 total hours (\$2,500 to \$10,000). Larger, more robust databases can take 100 to 2,000 hours (\$15,000 to \$400,000) or more. For customized projects that will take longer to complete, lower per hour rates may be available. Other costs may include the analysis of an existing database, hardware upgrades, software licenses, customer support, and training. Strikefit is a startup with the need to create a new database. After researching some database creation companies and comparing their prices, we estimate that the rate we are looking at is about \$100 per hour and a database similar to ours will take about 100- 150 hours to complete it. This comes out to approximately \$10,000-15,000, including database design and analysis.⁶

The total cost of our app, including app design and database creation, comes out to approximately \$50,000.

Physical Product Development

Expense	Cost
Manufacturing Capital Investment	\$88,000
R&D Investment	\$30,000

One of the highest costs to our company will be the capital investment needed to get the production of our insole off the ground. If another company is formed that can produce our insole as well as other soft sensors, we will be able to outsource our production and reduce the necessary investment. Also, additional product development will be necessary to incorporate the bluetooth and data analysis with the soft sensor technology, and thus create a functioning product.

Recommendation Research

Expense	Cost
Research Participants	\$20,000
Expert Participation	\$10,000

⁵ <http://www.executionists.com/blog/cost-to-build-websites-2014/>

⁶ <http://www.buyerzone.com/professional-services/database-design/bg-database-design-introduction/>

In order to ensure accurate fitting recommendations, we will gather data from 1,000 participants using the StrikeFit insole, and compare our data with the fitting recommendations of a Podiatry expert. Using the compiled database of recommendations associated with unique foot strike pressure patterns, we will be able to establish an accurate recommendation system. This is also a opportunity for StrikeFit to establish strategic partnerships. We hope to establish mutually beneficial partnerships with original shoe manufacturers. In exchange for our recommendation of their products, shoe manufacturers would provide us with their data on the geometry of their shoes. Also, we hope to establish a partnership with a Pittsburgh startup called Shoefitr, who collects 3D fitting data about a vast collection of shoe brands and models.

Demonstration of Urgent Need

Expense	Cost
Test Models and Marketing Materials	\$7,500
Outreach	\$10,000

To show potential customers that there is a need for StrikeFit technology, we will have to embark on a large scale marketing campaign. There are many ways to reach people, but an example would be through fitness expos at marathons and other athletic events. The athletes who participate in such events would already have an interest in receiving personalized fitting data about their feet, and would be a valuable use case for StrikeFit recommendations.

Enterprise Creation and Expansion

By initially establishing ourselves as an effective, easy and interesting method for shoe fitting through brick and mortar shoe stores, college sports teams and other niche markets, there are many more opportunities for StrikeFit to explore. Through active social media activity, and a conspicuous public image, StrikeFit will become a brand that people think of when they think of foot health and comfort. Ideally, when a customer decides they want to buy a quality shoe, they will expect to be fitted using the reliable and proven StrikeFit technology, thus making StrikeFit a necessary investment for any shoe store. Once established, the StrikeFit company can cash in on its brand recognition and expand into new markets.

One easy opportunity for expansion is into data collection. Currently, shoe manufacturers have to conduct research to determine how to design their shoes to be the most comfortable or effective. Once StrikeFit gains traction, it will naturally collect large amounts of data about the feet of the customers shoe manufacturers are targeting, which would be very valuable data for companies such as Nike, Asics or any other major shoe brand.

Another opportunity for expansion would be to follow the path of the heart rate monitor. Up until recently, heart rate monitors were used mostly in medical settings, or on athletes receiving specialized training analysis. However, the modern athlete can easily track their heart rate

throughout the course of their entire workout, or even their entire day. Similarly, once StrikeFit is established as a service provided to those seeking fitting recommendations or receiving athletic training from their university, the business can shift toward the consumer. The StrikeFit insole could be sold as a product that individuals use to track their own foot health, or it could be used as a tool to create custom consumer products like custom shoes or custom shoe insoles.

The final opportunity for expansion would be the application of the technology to other markets. Once consumers see the success of such a product in the shoe market, they may be more willing to try it in other areas, such as the fitting of other types of clothing, other types of impact testing (concussions, boxing), or ergonomic testing (ergonomic office seating, comfort gripping design).

Exit Strategy

The wearables space looks promising and with a 5 year projected valuation of \$40M, at that time we would advise to analyze technology trends and customer shoe-fitting trends. If trends look promising we would suggest focusing on B2C customers and also expanding the product line to include online custom shoe orders. If trends look dissapointing, we would advice selling the business to a competitor or a company like ShoeFitr, who would benefit from our foot scanning sensor technology.

APPENDIX

A) Return Rate by Retail Category

RETAIL CATEGORY	BLENDED RETURN RATE ⁽¹⁾
Apparel	9.96%
Auto Parts	18.26%
Beauty	5.24%
Children's Apparel	8.62%
Department Stores	16.50%
Footwear	9.13%
Hard Goods	11.94%
Home Improvement	11.17%
Sporting Goods	8.96%
Women's Apparel	10.02%
NRF Survey Average	8.60%

⁽¹⁾ Retail category rates derived from TRE analysis of 27,000 stores in the specialty and general merchandise retail segments.

http://www.theretailequation.com/Retailers/images/public/pdfs/industry_reports/TRE3013_NRF_Retail>Returns_Survey_Canada_2013.pdf

B) Questionnaire & Results

Questionnaire on Shoe Fitting Services

As you probably know, everyone's feet have different shapes, structures and pressure points. Shoes often only accommodate different lengths and widths, but do not take into consideration the many other unique aspects of people's feet.

We are developing a service that would provide personalized shoe recommendations based on both comfort and size. The service would analyze people's feet as they go about their daily tasks, collecting data while the user is running or walking, allowing for more accurate recommendations than current fitting techniques.

* Required

Age *

- ☐ 18-29
☐ 30-39
☐ 40-49
☐ 50-59
☐ 60+

Gender *

- ☐ Female
☐ Male

What is your occupation?

How many pairs of shoes do you purchase a year? *

- ☐ Less than 1
☐ 1-3
☐ 4-5
☐ 7-9
☐ More than 9

Where do you usually purchase your shoes? *

(Please select all that apply)

	Never	Rarely	Sometimes	Often	Almost always
In stores	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Online

If you have purchased shoes online, how do you determine what is your correct size for a particular shoe brand?

(Please select all that apply)

- ☐ Use the size chart
☐ Buy the shoes in your usual size
☐ Try the shoes in a store before
☐ Read the reviews
☐ Use Shazle or another size selection app
☐ Other

If you have purchased shoes online, how often do you have to return them based on uncomfortable fit?

- ☐ Almost always
☐ Often
☐ Sometimes
☐ Rarely
☐ Never

When purchasing shoes in stores, how often do you have to return them based on uncomfortable fit?

- ☐ Almost always
☐ Often
☐ Sometimes
☐ Rarely
☐ Never

What fitting problems have you experienced when buying new shoes?

Have you ever used any of these services? *

(Please select all that apply)

- ☐ Dr. Scholl's Custom Fit
☐ New Balance Foot Pressure Mapping
☐ Shuefit
☐ Atlas 3D Foot Mapping
☐ Running or Walking Gait Analysis
☐ Feet shoes fitted by a professional
☐ None of the above

☐ Other

Do you or have you ever used a shoe accessory to improve fit or comfort? -
(i.e. orthotic inserts, alternative insoles, ...)

- ☐ Yes
☐ No

If yes, could you describe the accessory?

Please rate each influential factors when buying athletic shoes. -

1 = least influential, 5 = most influential

	1	2	3	4	5
Size	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Price	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comfort	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate each influential factors when buying casual shoes. -

1 = least influential, 5 = most influential

	1	2	3	4	5
Design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comfort	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Price	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate each influential factors when buying formal shoes. -

1 = least influential, 5 = most influential

	1	2	3	4	5
Comfort	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Price	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If there were a free service that would help analyze your foot strike, the shape and structure of your feet, and pressure points, then recommend what shoes or insoles that would fit your feet best, would you like to use the service? -

- ☐ Yes
☐ No

If yes, where would you like to use this service?

(No fees will be charged)

- ☐ While purchasing shoes in stores
☐ Mailed to your home to provide recommendations for online purchases
☐ Both
☐ Other

If no, why not?

[Submit](#)

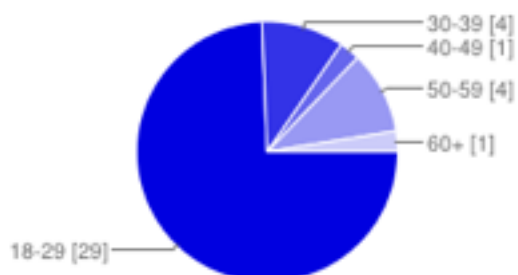
Never submit passwords through Google Forms.

Powered by

This content is neither created nor endorsed by Google.
[Report Abuse](#) [Terms of Service](#) [Additional Terms](#)

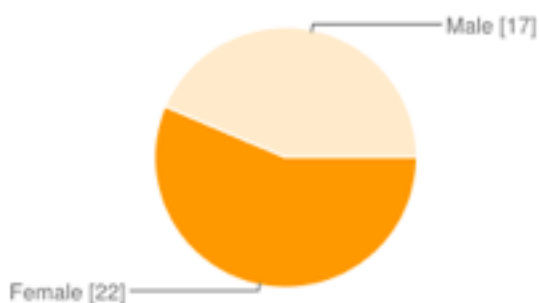
Results

i.Age



18-29	29	74%
30-39	4	10%
40-49	1	3%
50-59	4	10%
60+	1	3%

i.Gender

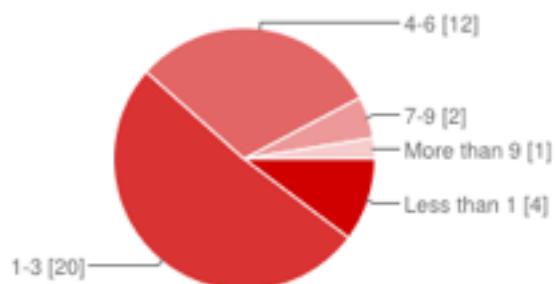


Female	22	56%
Male	17	44%

ii.What is your occupation?

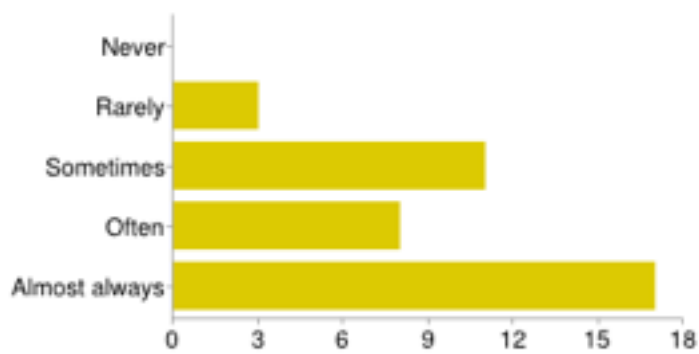
Researcher
Information Technology Officer
Academic
home maker
Promotions assistant
Natural resource manager
Student

i.How many pairs of shoes do you purchase a year?



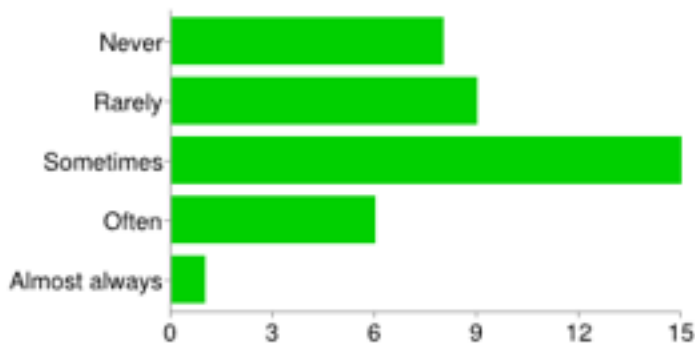
Less than 1	4	10%
1-3	20	51%
4-6	12	31%
7-9	2	5%
More than 9	1	3%

ii. In stores [Where do you usually purchase your shoes?]



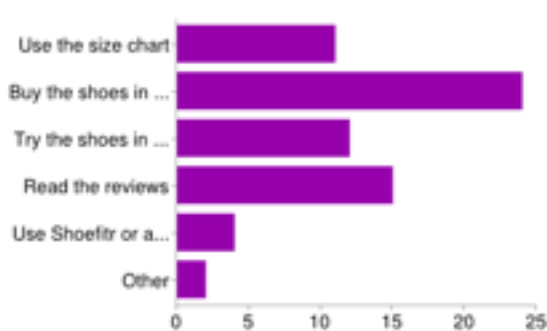
Never	0	0%
Rarely	3	8%
Sometimes	11	28%
Often	8	21%
Almost always	17	44%

iii. Online [Where do you usually purchase your shoes?]



Never	8	21%
Rarely	9	23%
Sometimes	15	38%
Often	6	15%
Almost always	1	3%

iv. If you have purchased shoes online, how do you determine what is your correct size for a particular shoe brand?



Use the size chart	11	28%
Buy the shoes in your usual size	24	62%
Try the shoes in a store before	12	31%
Read the reviews	15	38%
Use ShoeFit or another size selection app	4	10%
Other	2	5%

v.If you have purchased shoes online, how often do you have to return them based on uncomfortable fit?



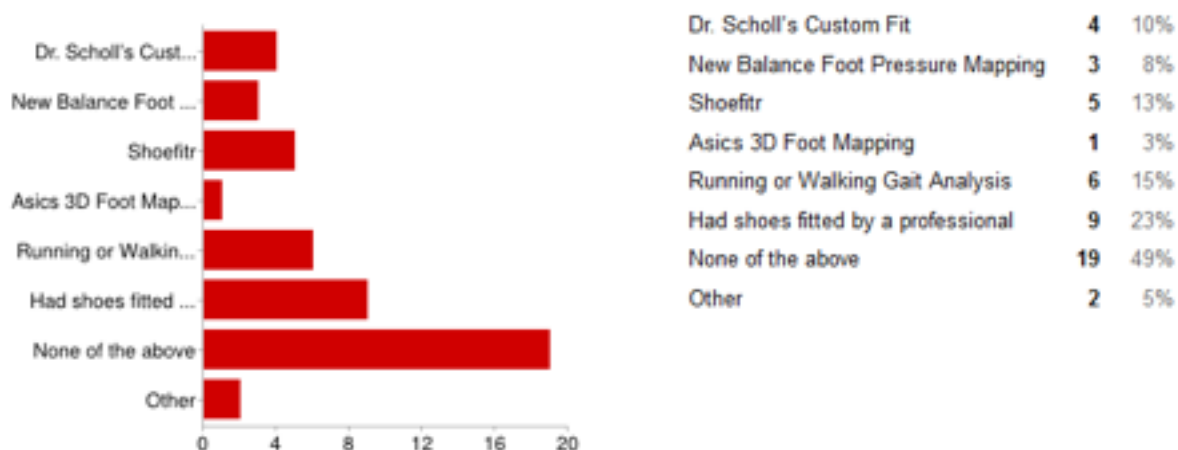
vi.When purchasing shoes in stores, how often do you have to return them based on uncomfortable fit?



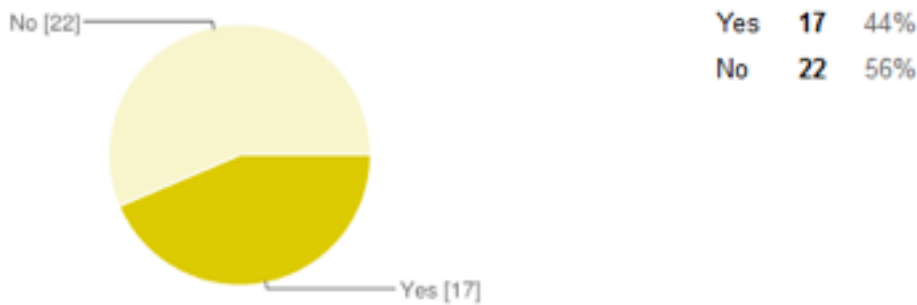
vii.What fitting problems have you experienced when buying new shoes?

Too tight
Too loose in the ball of the foot region. Rubs on my pinky toe. Bought a shoe that wasn't supportive enough.
Too narrow, not enough support, does not fit my high instep
When I buy them online different brands seem to be sized differently
Finding enough room in the toe area
None, usually. I know my size. Nike tends to run smaller.

viii.Have you ever used any of these services?



ix. Do you or have you ever used a shoe accessory to improve fit or comfort?

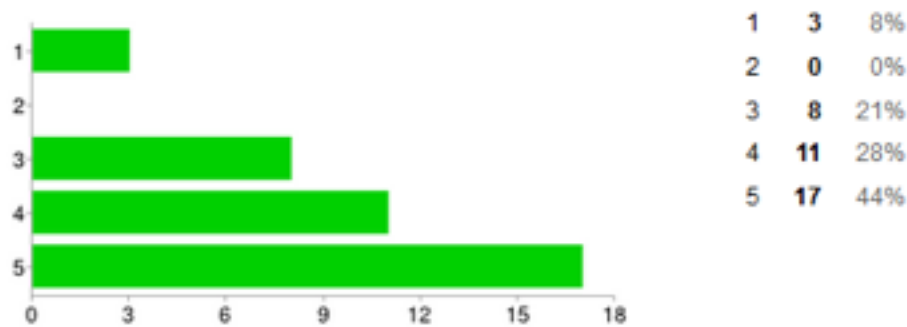


x. If yes, could you describe the accessory?

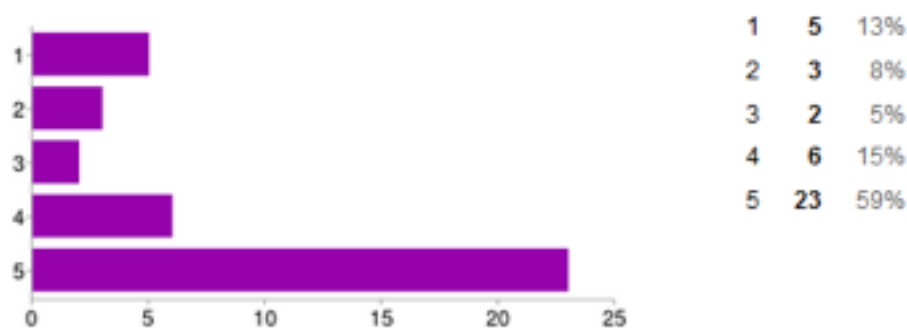
ball of the foot pads, used to use full shoe inserts
Inserts for high arches, moleskin, lift in one shoe (different leg lengths)
A simple insole
shoe inserts for high heels, at the front and the back of the feet when the shoes are slightly too big more my feet
Lift
Alternate insoles
insoles

i. Please rate each influential factors when buying athletic shoes.

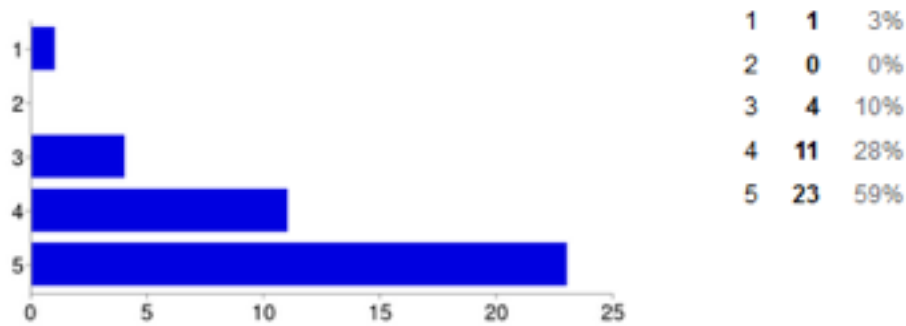
Design [Please rate each influential factors when buying athletic shoes.]



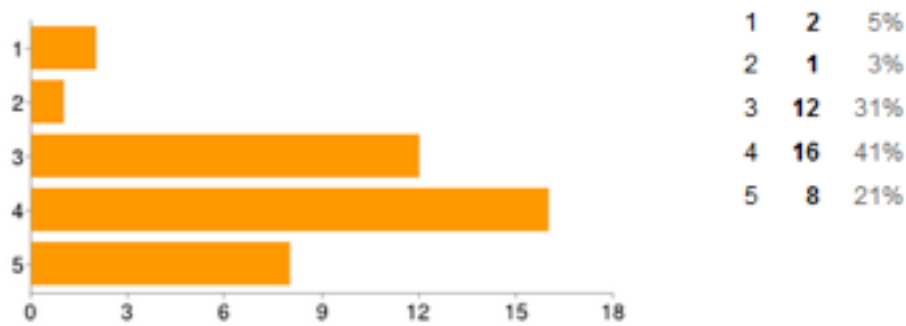
Size [Please rate each influential factors when buying athletic shoes.]



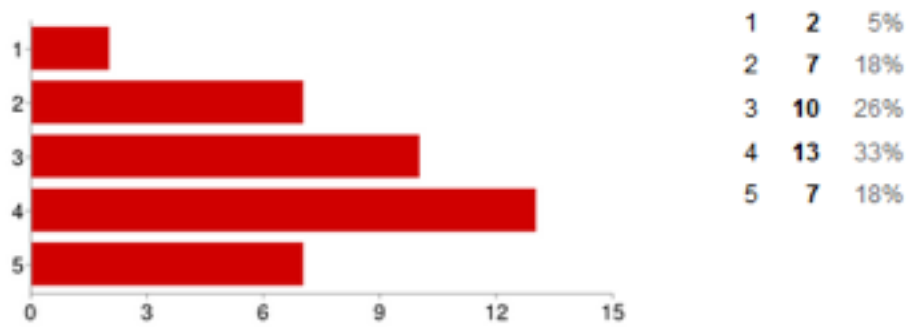
Comfort [Please rate each influential factors when buying athletic shoes.]



Price [Please rate each influential factors when buying athletic shoes.]

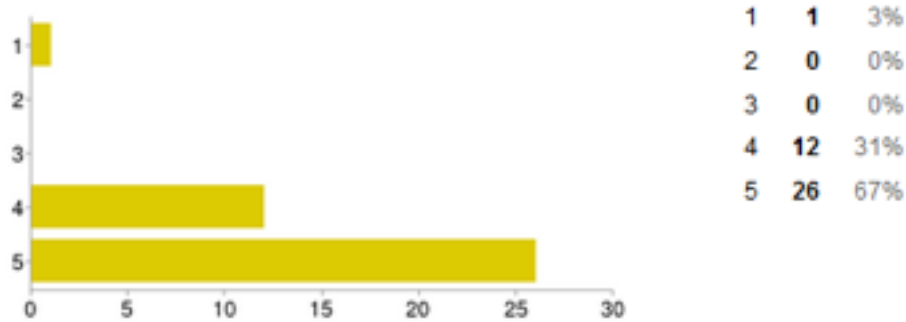


Brand [Please rate each influential factors when buying athletic shoes.]

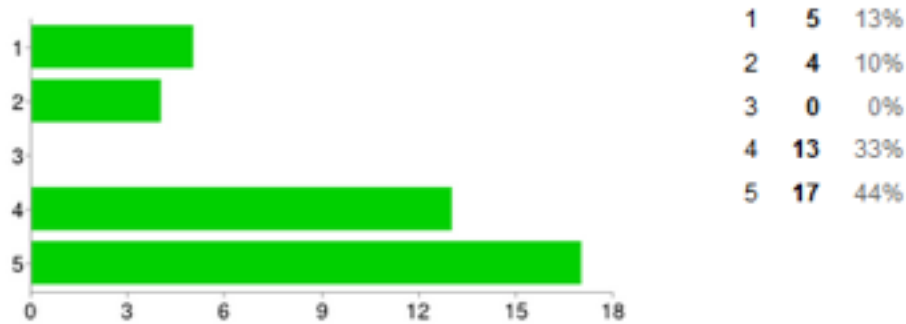


ii. Please rate each influential factors when buying casual shoes.

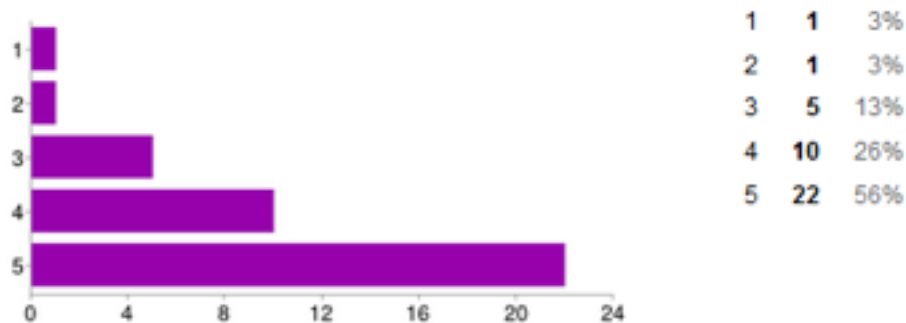
Design [Please rate each influential factors when buying casual shoes.]



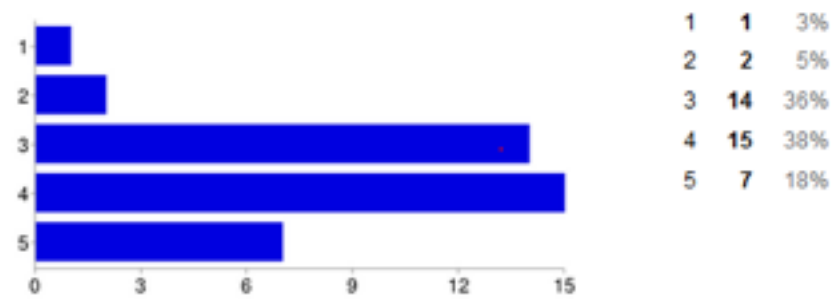
Size [Please rate each influential factors when buying casual shoes.]



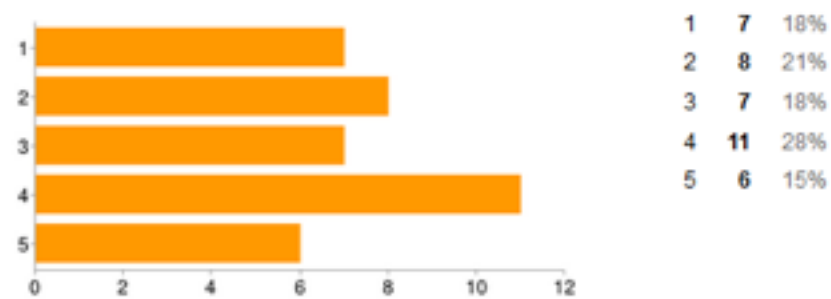
Comfort [Please rate each influential factors when buying casual shoes.]



Price [Please rate each influential factors when buying casual shoes.]

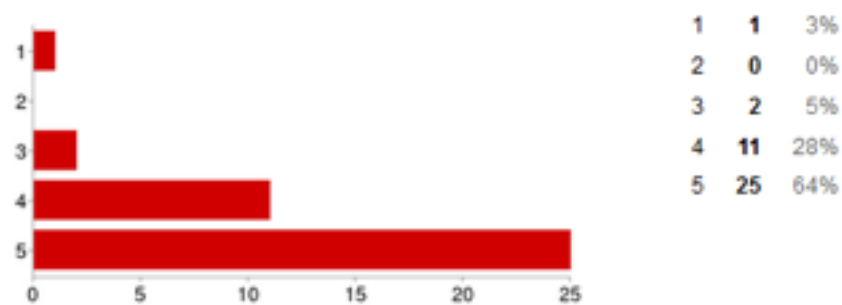


Brand [Please rate each influential factors when buying casual shoes.]

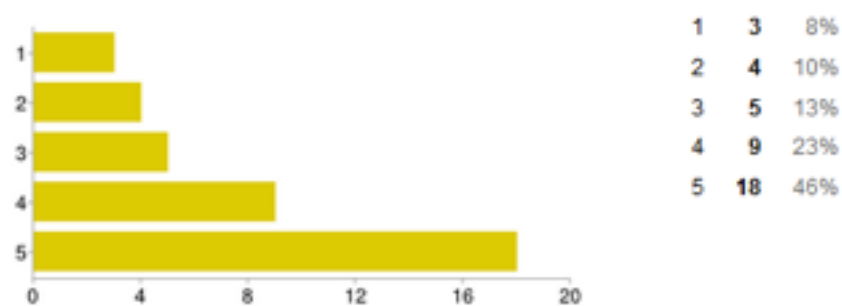


iii. Please rate each influential factors when buying formal shoes.

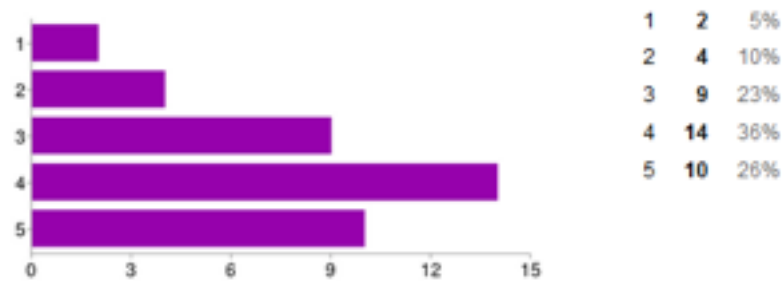
Design [Please rate each influential factors when buying formal shoes.]



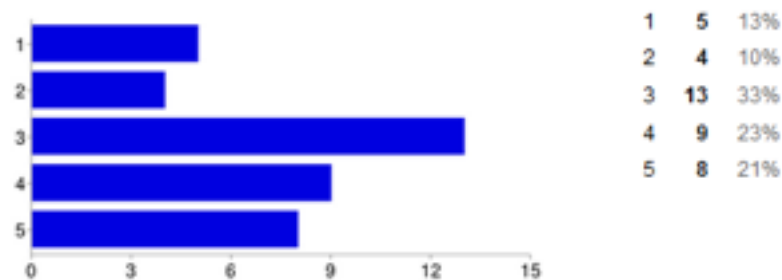
Size [Please rate each influential factors when buying formal shoes.]



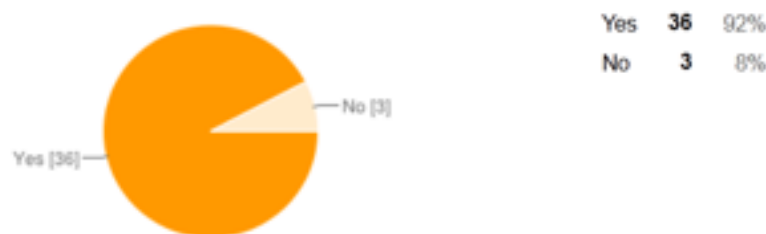
Price [Please rate each influential factors when buying formal shoes.]



Brand [Please rate each influential factors when buying formal shoes.]



iv.If there were a free service that would help analyze your foot strike, the shape and structure of your feet, and pressure points, then recommend what shoes or insoles that would fit your feet best, would you like to use the service?



v.If yes, where would you like to use this service?



Other Sources:

<http://www.1foot2foot.com/shoe-fitting.html>

<http://www.med.nyu.edu/content?ChunkIID=14645>

Material Cost Estimate Sources:

http://galliumsource.com/Online_Store.html

<http://www.dx.com/p/1a-lithium-battery-charging-module-blue-205188#.VH3KCivF8Us>

<http://www.aliexpress.com/item/3-7V-rechargeable-lithium-thin-navigator-tachograph-resistant-to-high-temperature-battery-MSD-certification/999374736.html>

http://www.alibaba.com/product-detail/HC-06-Bluetooth-module-with-baseboard_725804895.html?s=p