Accessories & Design

3D Printing - Product Feasibility Report

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REFAB Dar

Summary

Accessories are generally very suited to the 3D printing business model. New designs can easily be created and routed to market and the unlimited variety of products can satisfy the needs of a wide variety of consumers. As a business model however the products will be limited to a middle to high-income market as it will be hard to compete with the price point of mass-produced products. Furthermore, for the high end accessory market, the uniqueness and novelty of 3D can be a significant advantage. However, for the products to stand out and to truly be unique, a (team of) skilled 3D designer(s) will be needed to customize designs for the Tanzanian market.

For the business to be competitive, a high quality product needs to be made. Current prototypes have come close to market readiness but local technology still limits the reliability and the finish of the print. Overall there seems to be a solid business for local small-scale accessory and designs for the high end market. For scaling up the business from a one-person job to a profitable company, higher margin products need to be found. Example products could be lamps and other interior design products or tourist items where the recycled component of the product could increase margin potential.

Product overview

The 3D printed accessories that have been looked at are simple technological innovation that solve consumer technology problem and makes one's life easier. Most products are small or medium sized and therefore can be easily printed. The products are for everyday use and also can be marketable as souvenir items for tourists or to specific middle to high income groups.

Image sources[1][2]



In this feasibility study we've analyzed the potential of the following products:

- Phone case
- Phone/Tablet holder

[1] http://www.shapeways.com/product/PHH93ANSG/iphone-4-4s-case-cell-2?optionId=42992972&li=featured
http://www.shapeways.com/product/P463P5S6Z/arrow-tip-stone-age-pendant-key-fob?optionId=40900172&li=featured
http://www.shapeways.com/product/MQM2XCLNQ/headbuddy?optionId=3661888&li=marketplace

[2] http://www.shapeways.com/product/PHH93ANSG/iphone-4-4s-case-cell-2?optionId=42992972&li=featured
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- Business card case
- Voronoi lamp
- Elephant souvenir
- Salt and pepper shaker

Cost Analysis

Product	Filament cost	Production cost	Total cost	Current price (low end)	Current price (high end)
Phone case	$0,42	$2,16	$2,58	$2,30	$15
Phone holder	$0,57	$2,95	$3,52	$6,80	$15
Tourist Elephant souvenir	$0,73	$3,74	$4,47	$2	N/A
Business card case	$0,68	$3,48	$4,16	N/A	N/A
Salt and pepper shaker	$0,67	$3,43	$4,10	N/A	$10
Voronoi Lamp	$10,56	$54,32	$64,88	N/A	N/A

The products analyzed, although relatively low cost, can only really be profitable at a high end segment of the gadget market. In the high end market, the novelty and uniqueness of the product is advantageous compared to current mass produced produced. Furthermore, customizations can add additional value and increase the feasibility of the product line. From the shopkeeper interview we identified customization would be valued, but organizing the product delivery/pick-up would be a challenge. Especially as most customers in these shops buy 'on a whim'.

SWOT analysis

Strengths

- New product designs can be created and routed to market quickly (e.g. for phone cases, after release of each new smartphone model), and a large number of designs are freely available online and constantly increasing.[3]
- As 3D printing allows on-demand production, the stock required is relatively low thus reducing storage costs and increasing adaptability to customer/store needs.
- Easy adaptability of product portfolio, adapted to African market or even specific customer/store preferences. Shop owners can easily test what products work in their store, with low risk because of low volume order.

[3] http://on3dprinting.com/2013/03/21/ibm-sees-exponential-growth-of-3d-printing-industry/

- Short lead time from product order to delivery. A 3D printer can start producing immediately and, if there is sufficient capacity, products can be delivered within a day.
- Local production circumvents import tariffs and other related taxes.

Weaknesses

- Hard-to-beat costs compared to traditional injection mold manufacturing of plastic items. Limiting sales to high-end niche or design markets.
- Products can only be printed with a single material, losing an advantage against traditionally produced items that combine various materials like leather, microfiber and other finishes.
- Professional packaging would be needed to stand out in the high-end gadget market.

Opportunities

- Flexibility of 3D printing allows for a constantly growing product portfolio. This could open up opportunities to quickly adapt when new products, such as new smartphone models, enter the market.
- Relatively large and concentrated expat community in Dar could enable a business based on high-end designs. Especially for products (designer lamps for instance) that are hardly available. This opportunity will be magnified if a local startup is able to when able to connect to internationally known brands or designers.

Threats

- With the growth of 3D printing the novelty of it may wear off and the value for the high-end market diminish
- Products may be deemed as lower quality than imports

Demand analysis (mobile phone accessories)

Although there is generally very little market data on mobile phone accessories in East Africa, the growth and size of the overall international market gives an indication of market potential.

Global mobile accessories revenues 2015[4]	$81.5 billion
Projected yearly growth (CAGR)[5]	4.3%
Projected market size 2020[6]	$101 billion

4 https://www.abiresearch.com/press/mobile-accessories-revenues-total-815-billion-2015/
5 https://www.abiresearch.com/press/mobile-accessories-revenues-total-815-billion-2015/
6 https://www.abiresearch.com/press/mobile-accessories-revenues-total-815-billion-2015/

Financial Model

	Year 1	Year 2	Year 3	Year 4	Year 5
REVENUES					
Number of phone cases sold ($10)	100	500	1.000	2.000	5.000
Number of phone holders sold($12)	100	500	1000	2000	5000
Revenues from phone cases	1.000	5.000	10.000	20.000	50.000
Revenue from phone holders	1.200	6.000	12.000	24.000	60.000
Total	2.200	11.000	22.000	44.000	110.000
COSTS					
Salary (non production)	-	3.250	7.150	7.865	17.303
Total Personnel Costs	**-**	**3.250**	**7.150**	**7.865**	**17.303**
Total Rent Costs	**400**	**1.200**	**1.200**	**2.400**	**2.400**
Filament	99	497	994	1.987	4.968
3D print production cost	512	2.559	5.118	10.237	25.592
Distribution & Packaging	100	500	1.000	2.000	5.000

Transport	51	256	512	1.024	2.559
Total Cost of Goods Sold	**151**	**753**	**1.505**	**3.011**	**7.527**
Legal & Audit	0	0	500	1000	1500
Marketing & Customer Acquisition	250	1.000	2.000	5.000	10.000
Total Operating Costs	**250**	**1.000**	**2.500**	**6.000**	**11.500**
Operating Profit (EUR)	1.399	4.797	9.645	24.724	71.270
Tax	420	1.439	2.893	7.417	21.381
Net profit	***980***	***3.358***	***6.751***	***17.307***	***49.889***

To show the financial feasibility of an accessories startup a basic financial calculation was made. The calculation is not based on extrapolated revenue or traction and as such should not be considered a full financial planning. Instead it is a tool to show at what price points, and sales volume a business on 3D printed accessories could be viable. The full financial model can be found here (https://refabdar.squarespace.com/s/Financial_Plan_Accessories.xlsx)

Distribution

- The hacks will be primarily sold through market stalls or shops (some have already expressed interest for market experiments).
- Hacks can also be sold through an own online store or a marketplace for 3D printed products such as CGTrader, Shapeways, i.materialise or Thingiverse. Alternatively, online platforms such as eBay or Amazon could be used. However, the penetration of online commerce as well as the infrastructure for home delivery has to significantly improve for this to be an opportunity.

Challenges

The challenges associated with this category of products are mainly related to 1) elevating the quality standards and material diversity to compete with mass-produced items, 2) ensuring sufficient demand for the products, and 3) finding designer(s) to design new hacks so as to differentiate the product(s) from what is freely available online to the public. On the longer run it will be vital to find more high-margin products. Generally, these products have more complicated designs and will require strong technical capabilities within the team as well as collaboration with designers.

Recommendations

Within the ReFab Dar project there will be an experiment to test the market feasibility of the mentioned products in a high-end gadget store. As a first step, an entrepreneur in this field would have to be vigorous in testing various options, create a strong display as well as professional packaging and start exploring products with a high margin output. Furthermore, some of the technical difficulties with the local 3D printers and filament need to be solved to be able to scale up production while guaranteeing the quality of the product and the reliability of the printing process. The accessories and design project is led by a local entrepreneur, Aimable Karamaga, and will be continued to be supported by Reflow and ReFab Dar.

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