HACKTEX VIRTUAL TRAINING MATERIALS

VIRTUAL GUIDE
Learning unit 2
Lesson 1

Recognise market future developments, opportunities and obstacles

HACKTEX

Innovative smart textiles & entrepreneurship

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Content

Introduction

Identifying future developments and opportunities allows companies to align their strategies with the market's direction. By recognizing emerging trends and technologies, businesses can stay ahead of the competition and position themselves as industry leaders. Anticipating market growth helps in making informed investment decisions, targeting new customer segments, and expanding market reach.

The smart and advanced textile sector is characterized by rapid technological advancements. Recognizing market developments and opportunities helps companies identify potential areas for innovation and product development. This knowledge enables the creation of new and improved smart textile products that meet the evolving demands of consumers and industries.

Recognizing market future developments, opportunities, and obstacles in the smart and advanced textile sector is vital for driving growth, fostering innovation, mitigating risks, meeting customer needs, establishing partnerships, and ensuring regulatory compliance. It enables companies to stay competitive and capitalize on emerging trends, thereby positioning themselves for long-term success in this dynamic industry.

1. Recognise market future developments, opportunities and obstacles

1.1. Stay updated with the latest textile market trends

The advanced textile market is an exciting and rapidly evolving industry that offers a range of opportunities and obstacles. Here are some ways to recognize them:

Research and analyse the market: Conduct research on the advanced textile market to identify potential opportunities and obstacles. Analyse market trends, key players, and consumer behaviour to better understand the market dynamics.

Keep up with emerging technologies: Stay informed about emerging technologies, such as nanotechnology, smart textiles, and 3D printing, that are driving innovation in the advanced textile market. Identify new applications for these technologies and evaluate their potential impact on the market.

Focus on sustainability: The advanced textile market is increasingly focusing on sustainability, with more consumers seeking eco-friendly and sustainable products. Identify ways to incorporate sustainable practices into your business strategy, such as using recycled materials or reducing waste.

Consider changing consumer preferences: Consumers are increasingly looking for products that offer comfort, durability, and functionality. Identify new product categories that address changing consumer preferences, such as sportswear, healthcare textiles, and protective clothing.

Monitor regulatory changes: Keep an eye on regulatory changes that could impact the advanced textile market, such as changes to environmental regulations or trade policies. Stay informed about these changes and adjust your business strategy accordingly.

Collaborate with other businesses: Collaborate with other businesses in the advanced textile market to identify new opportunities and overcome obstacles. Work together to develop new products, share resources, and build strategic partnerships.

By using these strategies, you can recognize market future developments, opportunities, and obstacles in the advanced textile market and make informed decisions for your business.

1.2. Swot analysis

SWOT analysis is a useful tool for evaluating the strengths, weaknesses, opportunities, and threats of a particular industry, helping companies to develop strategic plans to capitalize on strengths, address weaknesses, exploit opportunities, and mitigate threats. Here is a SWOT analysis of the advanced textile sector:

Strengths:

Innovation and Advancements: The advanced textile market is constantly innovating and developing new products with improved performance and functionality. The integration of nanotechnology, 3D printing, and smart textiles are some of the advancements that are driving the growth of the market.

Diverse Applications: Advanced textiles have a wide range of applications in various industries such as healthcare, military, sports, fashion, and automotive. This diversity of applications makes the market more resilient to fluctuations in any one particular industry.

High Growth Potential: The market has significant growth potential due to the increasing demand for high-performance textiles, advancements in technology, and increasing consumer awareness and demand for sustainable products.

Weaknesses:

High Costs: The development of advanced textiles requires significant investment in research and development, production, and marketing. This makes it difficult for small players to enter the market and limits the growth of the market.

Limited Awareness: There is limited awareness of the benefits of advanced textiles among consumers, which limits demand for the products and growth of the market.

Sustainability issues: The use of synthetic materials implying the use of chemicals, the requirement of large amount of energy in the production and finishing phases, the complexity of the waste management processes due to the presence of electronic components and / or complex material compositions generate diverse sustainability issues that need to be considered.

Lack of fully automated processes: When textile manufacturing processes are not fully automated, they often require a significant amount of manual labor. This can lead to inefficiencies and slow down the production process, raising quality control and safety issues with increased costs.

Opportunities:

Emerging Markets: The emerging markets of Asia Pacific and Latin America have a growing demand for high-performance textiles and increasing awareness of sustainability, providing significant growth opportunities for the market.

Customization: The demand for customization is growing in the market, as consumers seek more personalized products. Advanced textiles offer a range of customization options and can meet this demand.

Technological Advancements: The integration of new technologies such as 3D printing, nanotechnology, and the Internet of Things (IoT) is driving innovation and creating new opportunities in the advanced textile market.

New composites: new composites offer a range of opportunities for the advanced textile industry, including lightweight and high-strength materials, improved resistance, enhanced functionality, sustainability, and versatility that enhance textile performance.

Threats:

Competition: The advanced textile market is highly competitive, with many established players and new entrants. Competition can lead to price wars and reduced profitability.

Regulatory Compliance: Compliance with environmental and safety regulations can be challenging and expensive for manufacturers. Failure to comply with regulations can lead to fines and damage to the brand's image.

Supply Chain Risks: The complexity of the supply chain, with multiple suppliers and partners, can create risks for manufacturers. Supply chain disruptions can lead to delays in production and delivery, affecting profitability and brand image.

Overall, the advanced textile market has significant growth potential due to its diverse applications, innovation, and sustainability. However, it faces challenges such as high costs, limited awareness, and competition, which must be addressed to ensure its continued growth and success.

2. Latest developments

Analysing the latest developments in advanced textile materials is crucial for generating new ideas because it helps understand the current state of the field and identify new opportunities for innovation. By staying up-to-date with the latest advancements, it is possible to identify new materials, technologies, and manufacturing processes that could lead to improved product performance, reduced costs, and increased sustainability. This, in turn, can lead to the development of new products and solutions that meet the changing needs and expectations of consumers.

Moreover, analysing the latest developments in advanced textile materials also helps in identifying potential challenges and limitations that may exist in the field.

2.1. Colour Changing Clothes

With varied degrees of success, designers have tried incorporating LEDs and e-Ink screens into clothing and accessories to obtain colour changing effects in textiles. The University of Central Florida's College of Optics & Photonics created the first colour-changing cloth that can be controlled by the wearer using a smartphone. Each thread woven into **Chromorphous**' fabric incorporates a thin metal micro-wire. Passing through the micro-wires, an electric current slightly raises the thread's temperature; special pigments embedded in the thread respond to this change of temperature by changing its colour. Customers can use an app to control both

the timing of the colour shift and the design that will appear on the fabric. According to the university, the method is scalable for large-scale production and might be used for clothing.

Image 1: Tthe Cromorphous bag produced with an active, user controlled, color-changing eTextile

2.2. Build-in sensors to collect medical data

Nowadays, there exist different companies offering garments / accessories that, thanks to different kinds of technologies, can record and monitor medical data both for health and fitness purposes.

While the smart socks can detect cadence, foot landing forces, and impact, the smart upper clothing can measure your heart rate.

Without the inconvenience of wearing a strap, the Sensoria Fitness Smart Sports Bra gives you accurate and reliable heart rate monitoring. Using traditional snaps, the sports bra can be worn with most Bluetooth Smart heart rate monitors and provides a comfortable low/medium level of support.

You can easily measure your fitness activity, keep track of your performance and improvements, and provide feedback on motions and medical data by pairing the HRM with the Sensoria Fitness smartphone app. The Sensoria Fitness Sports Bra is made of a blend of 74% polyamide, 18% polyester, and 8% elastane, and is thin and breathable to reduce changes in body temperature. Enabling your body to remain dry, the sweat wicking technology reduces discomfort.

Image 2: Tthe Sensoria Fitness Smart Sports Bra able to collect medical data

2.3. Fabrics that hervest energy

Georgia Tech researchers created energy-harvesting yarns that can be woven into washable textiles. They function by making use of the static electricity accumulated by the friction between two distinct materials. The fabric, which can be sewed into socks, sweaters, and other clothing, may capture enough energy from arm motion to power a sensor that, in the future, might be able to charge your phone.

A "wearable electronic device and operating technique" was patented by Samsung last year. The prototype has a processor unit on the front and an energy harvester integrated into the back of a smart shirt that generates electricity through movement.

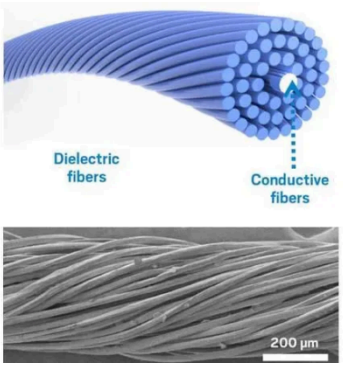

Image 3: Fiber composition of a harvesting fabric

2.4. Self-cleaning clothes

In general, nanotechnology-based self-cleaning surfaces fall into two categories. First, incredibly water-repellent, microscopic-rough surfaces: dirt can hardly adhere to them and is thus washed off by rain or a simple rinse in water. The second example is provided by photo-catalytic layers: fouling organic material is destroyed by solar radiation due to a layer of nanocrystalline titanium oxide.

Researchers from RMIT University of Melbourne discovered a method to make textiles wash themselves. The self-cleaning textiles only need a bit of sunshine to remove spills and stains. Cotton thread was used by researchers to grow three-dimensional copper and silver nanostructures, which were then woven into a piece of fabric. When the fabric was exposed to light, the nanostructures absorbed the energy, which excited the electronics in the metal atoms. This made the grime on the outer layer of the texture separate, cleaning itself in close to six minutes.

Dr. Rajesh Ramanathan, a materials engineer at the Royal Melbourne Institute of Technology in Australia, who led the research, said: 'There's more work to do before we can start throwing

out our washing machines, but these advances lay a strong foundation for the future development of fully self-cleaning textiles.

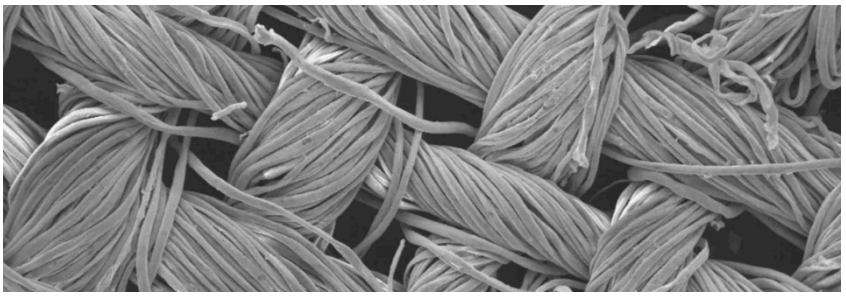

Image 4: A self-cleaning textile at the microscope

2.5. Integration of photovoltaic function

Pauline van Dongen designed the circular Radius travel bag, which features small solar power beads that allow users to charge mobile devices while they are on the go.

Little spheres that serve as solar cells make up a section of the bag. Energy from the strap is then fed through a charging wire that can be accessed by unzipping a magnetic clasp on the top pocket of the bag.

The team constructed a three-dimensional sculpture using several yarns and data-driven knitting machines using double-layered jersey fabric.

Image 5: Tthe Radius travel bag embedding small solar power beads allowing to collect energy

Want to know more about this topic?

ChroMorpheus – A New Fabric Experience

Sensoria Home Page (sensoriafitness.com)

Self cleaning textile – an overview – Free Technical Textile Industry Articles – Fibre2fashion.com

Georgia Tech scientists create energy-harvesting yarns – Fibre2Fashion

Radius – Pauline van Dongen

3. Considering Intellectual Property Rights Issues

Intellectual property (IP) comprises the knowledge, skills and other intangible assets which business can convert into usable resources to generate a competitive advantage.

The development of new advanced and smart textile products can raise various private property issues.

They are related to the protection of personal data collected and processed from users, such as biometric information or activity tracking data. Clear policies should be established to address data ownership, privacy protection, and user consent. Adhering to relevant data protection regulations and ensuring secure data handling practices, is crucial to maintain trust and compliance.

Also, the advancement of technology in textiles brings the risk of counterfeiting and infringement. Protecting against unauthorized copying or imitation of advanced and smart textile products requires implementing appropriate legal measures, such as monitoring and enforcement actions to address counterfeit or infringing products in the market. Such actions should be implemented both to avoid running into the counterfeiting of already developed products protected by patents and to protect ourselves from the copying of our products by others.

3.1. Looking for existing patents

To check if a product or technology is already protected by patents, it is possible to perform a preliminary search on patent databases to identify any existing patents related to your product or technology. The search can be conducted at different levels considering the wide of the market size you plan to reach.

National patent' offices provide searchable databases that can be useful in identifying patents granted within their jurisdictions.

At **regional** level exists different kind of database. For Europe we can refer to the European Patent Office (EPO).

If you plan to market your product or technology **globally**, consider conducting an international patent search. The WIPO's PatentScope database (WIPO) allows you to search for patents from multiple countries simultaneously. Another source can also be Google Patents - https://patents.google.com/

Use relevant keywords, technology descriptions, or specific terms related to your product or technology to conduct the search. Review the patent titles, abstracts, and claims to determine if any existing patents cover similar subject matter. Carefully review the patent documents that you identify during your search. Pay attention to the claims section, as they define the scope of protection provided by the patent. Assess the similarity of the claims to your product or technology to determine if there may be potential conflicts. If you find patents that are potentially relevant to your product or technology, consult with a patent attorney to obtain

professional legal advice. They can help you assess the potential infringement risks, analyze patent validity, and guide you on potential strategies to navigate the existing patent landscape.

1.1. IPR protection

The development of advanced and smart textile products often involves collaborations between multiple parties, such as researchers, manufacturers, and technology providers. Clear agreements and contracts should be established to define the rights, responsibilities, and ownership of intellectual property generated through such collaborations. Maintaining confidentiality and protecting trade secrets is important in the textile industry, especially when dealing with advanced technologies. Developers and manufacturers may need to establish robust confidentiality agreements to safeguard proprietary information and prevent unauthorized use or disclosure.

Companies and individuals involved in the development of advanced and smart textile products may need to protect their intellectual property rights. This includes patents, trademarks, copyrights, and trade secrets associated with innovative technologies, designs, or processes. Properly identifying, securing, and enforcing these rights is crucial to protect investments and encourage innovation.

In cases where advanced textile technologies become industry standards, there may be a need for fair and reasonable licensing of standard essential patents (SEPs). This ensures that companies can access necessary technologies without facing unfair barriers or excessive licensing fees.

The table below contains a summary of the basic features of Intellectual Property Rights formal protection methods.

IPR	Target	Requirements for registration	How to obtain the protection
Patent	Product, method	New, differs fundamentally from the others and industrially applicable	Granted
Utility model	Product	New, differs clearly from the others and industrially applicable; but does not necessarily meet patent requirements	By registration
Registered design	Appearance of concrete object made industrially or by hand	Design differs essentially from others	By registration
Trademark	Symbol of product or service: character, work, number, pattern, signal, sound, etc.	Identifying, clearly distinctive, not contrary to good practice	By registration or establishing
Copyright	Literary or artistic work	Independent and original	Automatically

Want to know more about this topic?

European Patent Office (EPO) - https://www.epo.org/.

WIPO's PatentScope database (WIPO) - https://www.wipo.int/patents/en/

Google Patents - https://patents.google.com/

IPR-intensive industries and economic performance in the European Union - Industry-level analysis report, fourth edition October 2022 – EUIPO - https://euipo.europa.eu/tunnel-web/secure/webdav/guest/document_library/observatory/documents/reports/IPR-intensive_industries_and_economic_in_EU_2022/2022_IPR_Intensive_Industries_FullR_en.pdf

Remarks

- It is important to stay updated with the latest market trends
- A swot analysis can help you to view things in different perspectives orienting your decisions
- By studying the latest market trends and developments you can get inspiration or spot new opportunities

- Intellectual property rights implications need to be taken into account from the first steps of a new product / idea development

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N. Olinder, K. Fedyakin, E. Korneeva – Personal Data Protection in the Internet of Things - Advances in Economics, Business and Management Research, volume 171, Atlantis Press (2021)

Seliina Päällysaho, Jari Kuusisto, Intellectual property protection in service sector (2008) – Researchgate

Case studies

- ChroMorphous - A New Fabric Experience
- Sensoria Home Page (sensoriafitness.com)
- Self cleaning textile - an overview - Free Technical Textile Industry Articles - Fibre2fashion.com
- Georgia Tech scientists create energy-harvesting yarns - Fibre2Fashion
- Radius - Pauline van Dongen

Further resources

- https://www.startus-insights.com/innovators-guide/textile-industry-trends/

Partnership

Project coordinator
TUIASI - Universitatea Tehnica Gheorghe Asachi din Iasi
www.tuiasi.ro

AEI Tèxtils - Agrupació d'Empreses Innovadores Tèxtils
www.textils.cat

CIAPE - Centro pre l'Apprendimento Permanente
www.ciape.it

CRE.THI.DEV - Creative Thinking Development
www.crethidev.gr

TITERA - Technically Innovative Technologies
www.titera.tech

UB - Högskolan i Borås
www.hb.se

UNIWA - Panepistimio Dytikis Attikis
www.uniwa.gr

UPC - Universitat Politècnica de Catalunya
www.upc.edu

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