Potential of Cactus Leather in Pakistan's Leather Industry: A Qualitative Analysis.

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Abstract

The rising trend of sustainability worldwide has significantly influenced various industries, transformed not only retail but also reshaped the luxury sector. One notable shift is the increasing focus on vegan leather, with cactus leather emerging as a promising alternative. This study explores the potential of cactus leather in Pakistan, particularly how it can contribute to sustainability in the country's leather industry. By introducing cactus leather, the research aims to raise awareness about sustainable practices and offer a viable alternative to traditional animal leather. The methodology employed in this study is qualitative, based on interviews with leather manufacturers, and the data was analyzed using a thematic analysis framework. The key findings highlight the potential of cactus leather as a sustainable substitute for animal leather, emphasizing its durability, aesthetic appeal, and environmental benefits. Cactus leather not only provides a cruelty-free option but also addresses issues related to pollution and water usage in leather production. The research aims to introduce cactus leather to the Pakistani market, particularly in regions like Thar and Kharan in Sindh and Baluchistan, where cactus farming could thrive and benefit local communities. Cactus leather eliminates the need for animal-based materials, allowing consumers to wear leather products without the associated guilt of animal cruelty. Additionally, the production process of cactus leather is less water-intensive and requires fewer toxic chemicals than traditional leather processing, further reducing its environmental impact. This study underscores the potential for cactus leather to revolutionize the leather industry in Pakistan, aligning with global sustainability trends and offering a practical solution to environmental and ethical concerns.

Key Words: *Vegan leather, sustainability, cactus leather, leather industry.*

Introduction

Leather, one of the earliest materials used by humankind. Now it carries a major sector in textiles globally. As the rising demand for leather so has its criticism of use, due to its inflexible processes which are causing damage to the environment, animals, and workers. (Cliffe, 2019) Today's environment can't support the current level of consumption caused by its high use of resources and pollution. For at least 32000 million tons of Carbon dioxide (CO2) emitted every year (Cliffe, 2019). For that reason, people are finding more alternatives to provide the best quality products with the same properties.

Initially, the term "vegan" is defined as "non-dairy vegetarian". It was first introduced in the UK in 1944. Veganism is the philosophy and lifestyle of the consumer which excludes all forms of violence and cruelty to animals for clothing, food, and any other (Luciano et al., 2023). People promote alternatives for the benefit of animals and to save their rights (Ali et al., 2023). In America, the number of vegans increased by 600% in the last three years (Cliffe, 2019), in the Netherlands it has increased by 48% in the past two years, in the UK the number of vegans has increased by 350% in a decade. Although there are major steps to be taken just to avoid cruelty to animals, London and Amsterdam fashion week rejected using fur and even Helsinki fashion week decided to ban animal leather in terms to protect animal rights and freeing the environment from pollution for their 2019's fashion collection. The first 'vegan' fashion week was held in Los Angeles in 2019 (Cliffe, 2019).

Background of the study

If we talk about vegan leather, it is also known as faux leather or an alternative to leather. It is a fabric made up of animal skin but as people are getting more aware they need to adopt sustainable practices and something which is out of cruelty. Leather could be made up of many materials such as plastic-based or plant-based. It will not only make you look good but it will also make you feel good. Every year there are billions of cows, dogs, reptiles, alligators, pigs, and many other animals slaughtered for their skins. Many of them cut apart without painkillers and skinned them in their consciousness.

Apart from it, the leather industry is also known as the most polluted industry which is affecting the environment by having so many chemical processes and releasing toxic chemicals into the sea. Turning animal skin to leather comprises 170 types of chemicals which include coal tar derivatives, formaldehyde, oil dyes, finishes, and many others. (Dixit *et al.*, 2015)

Purpose of the study

The purpose of studying is to give an alternative to animal leather which has the same properties and can be much more durable. Also, give an aesthetic look so when people wear them they can adorn themselves and feel restful. Also, something which doesn't cause pollution and cruelty-free products. We studied different materials which are less polluted to the environment and work as substitutes for animal leather. We came up with a solution that cacti are the best option for all. It will not only solve irrigation problems but also has lesser processes and doesn't need toxic chemicals for manufacturing. The purpose of this research is to introduce a whole new concept to the market which is using animal products till now. One of the purposes of this study is to make the industry grow cactus leather in Pakistan in deserted areas like Thar and Kharan, especially areas in Sindh and Baluchistan where famine gets on the peak in summers. This will create a CSR activity for the industrialists and give an absolute benefit to the locals as cactus farming can be done on a small scale as well (Junaid et al., 2023). Cactus leather eliminates the animal element from the material, meaning that anyone can wear it guilt-free. Not using or abusing any animals also eliminates a ton of waste and pollution: The process of turning animal hides into toughened leather is largely water-dependent.

Problem statement

In Pakistan, the leather industry is known as the second-largest export earning sector of the national economy. They are established in Karachi, Lahore, Multan, Peshawar, Kasur, and Gujranwala. It is divided into six sub-sectors: gloves, garments, footwear, shoe sole, goods made of leather, and tanning. As we know, there is a rising trend of veganism worldwide. People are moving towards sustainable products. It hasn't only changed the retail market but also reshaped the luxury industry. But when we talk about the Pakistani leather market people aren't much aware of veganism and sustainability. Our main focus is to introduce cactus leather in the Pakistani leather industry and to make them aware of how sustainable it could be and what benefit it gives.

Research Questions

- Is Pakistani leather manufactures have the potential to produce cactus leather?
  What type of framework would be required to consider the manufacturing of cactus leather?

- How can Pakistan's leather manufacturers become sustainable from solid waste and water pollution?

Types of leather

Leather production is one of the oldest manufacturing processes globally. People do use it for making handbags, shoes, gloves, and many other things rather than textiles.

We do have different types of leather by which we process and create finished products. (Different Types of Leather, 2021)

Full-grain leather

In which hair is removed from the hide and immediately goes for tanning. It is most durable and resists moisture very well. Its properties enhance as it gets older (Different Types of Leather, 2021).

Top grain leather

The second layer of the hide is used to make products from top-grain leather. It is sanded, buffed, and then shaved off. Commonly used for handbags (Different Types of Leather, 2021).

Nubuck leather

It is known as one of the luxurious leathers in the market with velvety touch in it. It is used for high-end footwear. Deer hides are used to process this leather (Different Types of Leather, 2021).

Faux or synthetic leather

Artificial leather is the alternative term that is used for synthetic leather. It is made up of polyvinyl chloride (PVC) and polyurethane (PU). As considered to be priced it is cheaper than the natural leather, used for upholstery, car interiors, and furniture. The main drawback of using synthetic leather is that it becomes sticky and unpleasant when in contact with human skin. (Different Types of Leather, 2021)

Cork leather

It is harvested every 9 years from the 25-year-old cork tree and left to dry for 6 months then it goes for boiling and steaming. Used to make accessories, bags, and shoes. But it can't be used for making clothes and has a low variety of colors (Cliffe, 2019).

Leaf leather

Fallen leaves are collected, then soaked in water, dried together to bond a sheet. Then goes for dying (Nazir & Yu, 2023).

Sustainability

Over the years, the concept of using sustainable products has risen. As the demand for high fashion garments rises, people need something which is more sustainable for the environment. They show the least interest in products that are harmful or violating animal rights. Now the business owners, customers, and investors are the main driver to communicate sustainable credentials. To meet the goals of today's generation companies are trying to work more and more on reusable or biodegradable products. Sustainability is one of the main aspects rising vigorously, as we all are aware of the leather industry that is known for producing most nontoxic chemicals during tanneries (Nazir et al., 2023). Our aim for this project is to introduce leather which takes lesser processes, saves animal rights, and produces a product that is more environmentally friendly. (Singh and Gupta, 2013; Omoloso *et al.*, 2020). Environmental sustainability is known as 'planet' based sustainability which endures ongoing air pollution, inhaling toxic chemicals. To get rid of these issues and to have healthy communities, we need clean air and natural resources, products that are less harmful to human and animal health. On the other note, social sustainability is known as 'people' based, it is related to the health and safety of laborers. Companies should fulfill all their laborers' rights and make sure that no harm will be done to them.

Cacti plant

Our main focus is to introduce cactus leather in the Pakistani leather industry and to make them aware of how sustainable it could be and what benefit it gives. Cactus leather was introduced by two entrepreneurs from Mexico to aware people of the alternative of animal leather. It will not only solve irrigation problems but also save the environment from getting polluted by doing chemical processes. Adrian and Marte introduced cactus leather made of opuntia nopal cactus (prickly pear). They said in Mexico, Zacatecas which is the state of the country, have a huge range of cactus leather there. They grow them and select only mature leaves without damaging the plant to process their products. Harvesting took place every 6-8 months. Cacti only need rainwater and natural minerals to grow. The selected cactus is very resilient and strong, it can withstand low temperatures during winters. It has soft thorns which can easily be handled by an agricultural team. The plant itself lasts up to 8 years, after cutting mature leaves, let cacti dry under the sun to meet targeted levels of humidity. It doesn't need any other source to get it dry. Even though nopal cactus isn't not only benefiting the textile industry but also the food and

pharmaceutical industry. It is used for medicinal purposes for controlling high cholesterol, diabetes, and many more. It is also used as the source of weight loss. (WHY DESSERTO? 2021) (Opuntia - Wikipedia, 2021)

Characteristics of cactus leather

1. The durability of ten years.
2. It has elasticity.
3. Breathable.
4. Customizable.
5. Similar to synthetic and animal leather.
6. It doesn't need tons of water to grow.
7. Lesser processes to produce leather.
8. Doesn't harm the environment.
9. Partially bio-degradable.
10. Cruelty-free leather. (Kapfunde, 2021)
11. Leather-like texture and properties.
12. No herbicides or pesticides were used.

Pakistan's leather industry

The world trading system is changing so fast in terms of trade barriers and technological advancement. Increasing international change has raised the value of Asian industries where they can produce goods and export them globally. By talking about Pakistani leather industry which rates as the second-largest export earning sector after textiles. Currently, this sector is contributing $700 million per year. It has the potential of increasing and multiplying to higher levels of exports especially in garments and footwear. This sector has a large space of employment and a huge contribution to the national economy. About 90% of leather products are exported as finished goods. In the years 2006 and 2009, Pakistan's leather products export value grew by 22.34% and 7.38% respectively(Shahab and Mahmood, 2013).

The major sectors are Karachi, Kasur, Sialkot, Lahore, Gujranwala, Multan, and Peshawar. There are 784 leather units, 461 leather garment manufacturing units, 348 gloves, over 524 footwear units in the country. In 2014, Pakistan took 1st position in the international market for exporting gloves. It caters to 5% of the country's GDP (Hashmi *et al.*, 2017). Though the industry is expanding in Pakistan, it faces many challenges like the consistency of supplying raw materials, and the traditional system of slaughtering in the country produces low-quality hides which don't meet national standards (Khan, Anwar, et al., 2023). If it continues the consumer will easily be shifting to other countries. Despite having opportunities Pakistan is facing many challenges. Mostly the leather products being produced here are low-quality and low-grade

leather which isn't competing with the Indian or Chinese market. (Ghafoor, Aslam and Rasool, 2012).

Cacti leather v/s Animal leather

Table 1
Difference between cacti leather and animal leather

1. Only mature leaves of the plant are harvested, not the whole plant.	1. Once an animal is killed, it goes through many processes to have the final product.
2. It doesn't need chemicals to process, it can be dried under the sun for three days.	2. It needs tons of toxic chemicals which pollute the environment.
3. Human health is safe.	3. Toxic chemicals are affecting human health.
4. Cruelty-free leather. (no harm to animals)	4. Animals hide.
5. Leather made up of (opuntia: nopal cactus).	5. Leather is made up of calf, goats, sheep, ostriches, snakes, and many others.
6. Partially bio-degradable.	6. Biodegradability depends on chemical processes.
7. Lasts up to 10 years or intensity of usage.	7. It can last for decades.
8. Prices will be slightly cheapest from animal leather.	8. Expensive leather.

Literature Review

Pakistan's leather industry

The leather industry is ranked at the 2nd number on total export earning sector and provide up to 5% GDP to Pakistan. About 500,000 people are employed in this sector. The skin of animals and refined into finished products by processing through tanneries (Hashmi *et al.*, 2017).
Pakistan's leather industry is facing environmental and social problems through its leather industry sector still gives the third-largest export share.(Wahga, Blundel and Schaefer, 2018).
The pollution in the leather industry is caused by the discharge of solid waste and contaminated water, which decreases the productivity level in agricultural fields and affects marine life. (Vogt & Hassan, 2011). Unfortunately, the government of Pakistan is very no serious about the environmental problems caused by the leather industry. (Battaglia et al., 2010). Though local leather firms took some actions regarding the tanneries because of export orders and to survive in

the international market. The support in the technology sector from United Nations Industrial Development Organization (UNIDO, to build a leather treatment plant in Kasur and Karachi (Wahga, Blundel, and Schaefer, 2018)

Effects Of Tanning in The Leather Industry

Tannery water waste in leather industries leads to toxic water waste consisting of hazardous chemicals and drainage of this waste harms marine life. The salinized water goes through rivers and groundwater which destroys the agricultural crop of the entire area. In India due to tannery water, it has been estimated that 55000 ha of land is polluted, and around 5 million people's social life is affected. (Dixit et al., 2015). Globally mostly all leather industries are facing issues regarding the disposition of waste and closing of tanneries for not meeting the required norms like total dissolved solids (TDS) and biochemical oxygen demand (BOD). This untreated waste contaminates the irrigation water and its land. (Kanagaraj *et al.*, 2006)

Health Issues from Tanneries

In Bangladesh and most of the underdeveloped countries, many workers are suffering from health problems. The workers and the society near tanneries are affected directly and indirectly. The problems people usually face from tanneries are skin problems, breathing problems, and gastrointestinal disease. These all problems are caused by toxic chemicals used in the tanning process. The intoxicated water is then drained into nearby rivers where the society and marine life are also disturbed (Khan et al.). Even water used for bathing purposes for cattle farming is also intoxicated and animals also face skins problems. To save society from the hazardous problem leatherworking groups and government should take actions to stop these kinds of dumping. Safety precautions and safety gear should be provided to these workers so that they can save their bodies and be safe from these chemicals. (Mohanta, Saha and Hasan, 2012)

Process and Operations

Figure 1

Technological options for leather processing

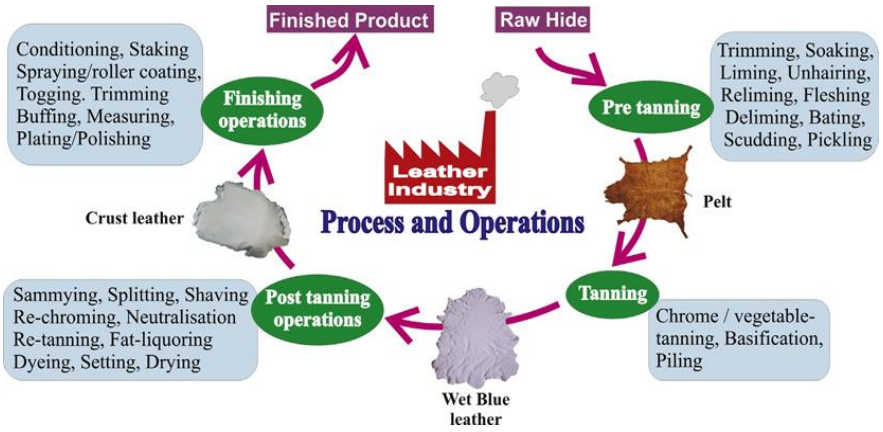


Fig.1 shows the process and operations of leather as the leather factories take raw hides and start the pre-tanning process where trimming, soaking, liming, unhairing, relining, fleshing, deliming, scudding, and pickling is done. Now the leather is converted into pelt form and is forwarded to tanning process where chrome/ vegetable tanning is done which is prescribed by the buyers, process like basification and piling is also done. Now the leather is in form of wet blue leather and is sent to post tanning operations where summing, splitting, shaving, re-chroming, neutralization, retaining, fat-liquoring, dyeing, setting, and drying process is done. Once the post tanning operations are completed leather is converted into a crust form, now it requires finishing process and conditioning, staking, spraying, togging, trimming, buffing, measuring, plating/polishing is done. After these four processes, the rawhide is converted into finished leather. (Dixit *et al.*, 2015).

Leather and its impact

Leather is traditionally made from animal skin, primarily sourced from calves, sheep, pigs, and cattle, particularly in the United States. The process involves tanning and curing the hides to produce a durable material used in various products like clothing, car accessories, and furniture. The leather industry, fueled by demand for its flexible and long-lasting qualities, especially in shoes, apparel, and furniture, processes over a billion skins and hides annually, often as byproducts of the meatpacking industry.

However, this process is not without ethical concerns. The transport and handling of these animals often involve severe confinement and inhumane practices. While domestic animals are the primary source, exotic species like zebras, kangaroos, and crocodiles are also hunted for their skins. In response to these ethical and environmental issues, there is a growing consumer shift towards vegan and imitation leather products as sustainable alternatives to genuine leather.

Water problems in Pakistan

Pakistan faces a water scarcity problem as Pakistan is one of the water-stressed countries in the world. It is due to the blockage of western rivers water by India. As Pakistan is dependent on only one river which is the river Indus and at times of floods Indian government opens up the water flow which destroys the agricultural land in Pakistani and affects the citizen (Iqbal, 2010).

Sustainability in the leather industry

Most of the industries are approaching eco-friendly methods to achieve environmental sustainability by practicing green chemistry, managing water, and solid waste, and limiting the amount of pollution. Less exposure to hazardous chemicals increased the health and safety of the employees. (Gupta, Gupta, and Gayathiri, 2018)

The emission of harmful gasses from leather factories affects the employees, the citizen living nearby, and the community. The basic need is needed by everyone like justice, safety, diversity which gives social sustainability to the community. (Omoloso *et al.*, 2020)

UN's 17 Sustainable Development Goals

The 17 sustainable development goals which are also called the global goals which are acquired by the United Nations in 2015 as a global call to make sure that by 2030 the entire planet is sustainable.

The goals indicate the development in social, economic, and environmental sustainability. These goals are designed in such a way that by 2030 the entire planet will not face poverty problems, diseases, and discrimination.

GOAL 1: No Poverty

To end poverty and provide basic needs and services. Helping the affected societies ad communities all around the world.

GOAL 2: Zero Hunger

To end all types of hunger and help those who are facing malnutrition problems.it will also promote sustainable ways in agricultural, technology, and food markets. Investment in agricultural areas to increase productivity.

GOAL 3: Good Health and Well-being

It aims to provide basic health facilities and offer basic health and safety rights to the people.

GOAL 4: Quality Education

To provide free education to boys and girls till secondary schooling. To eliminate gender and status issues.

GOAL 5: Gender Equality

To treat men and women with equal rights including property, technology, and the internet. To encourage women to lead the world.

GOAL 6: Clean Water and Sanitation

To ensure that purified water is consumed in the entire world with proper sanitation facilities are provided to each individual.

GOAL 7: Affordable and Clean Energy

To invest in the infrastructural department so that every country has efficient energy. To invest in energy departments in the entire world.

GOAL 8: Decent Work and Economic Growth

To provide sustainable economic growth and higher productivity. To provide employment.

GOAL 9: Industry, Innovation, and Infrastructure

To promote industries towards innovations, to ensure energy efficiency, and to do research development in different sectors.

GOAL 10: Reduced Inequality

To make sure to eliminate the difference between sex, race, status, and countries should end.

GOAL 11: Sustainable Cities and Communities

To create job and business opportunities and proper housing facilities. To improve infrastructure, public transport and improve urban planning.

GOAL 12: Responsible Consumption and Production

To have a sustainable production process.

GOAL 13: Climate Action

To make the earth greener so that the climate is moderate and there is no extreme weather.

GOAL 14: Life below Water

To save the marine line and coastal ecosystem from dumping of solid waste. To ensure industries to be sustainable and treat the drainage water properly.

GOAL 15: Life on Land

To stop deforestation and stop the demolition of natural habitats.

GOAL 16: Peace and Justice Strong Institutions

To end all kinds of violence and government should work with the communities to eradicate problems with each other

GOAL 17: Partnerships to Achieve the Goal

This goal aims to unite each other on a single goal so that the world is sustainable and unite in the future. ("Sustainable Development Goals | United Nations Development Programme")

Cactus leather

It is in the notice that cactus is good to the human body and does not require a lot of water and replanting of plants is also not required as only cactus leaves are cut out to produce cactus leather. (Desserto, 2020)

Since 2000 luxury consumers have contributed significantly to market growth as they have more than tripled throughout the past 20 years to approximately 330m consumers worldwide (Boston Consulting Group, 2017). Leather brands have been among the most valuable in the luxury industry (Deloitte, 2017).

Vegan leather

The vegan leather industry is on the rise because there is an increasing population of vegans. The number of global consumers who identify as vegan has grown 61% from 2014 to 2017 (Global, 2018). Veganism is referred to as the movement or philosophy that advocates and entails abstinence from consuming any animal product - such as meat, dairy, eggs, leather, silk, etc. - and stands against widespread animal exploitation (Ulusoy, 2015)(Payne, Brough, and Musk, 2016). It is a growing movement that specifically aims at reinforcing the philosophy behind social justice through extending morality towards animals, respecting their lives, and fostering compassion between animals (Ulusoy, 2015). Sustainability has become a key element across all industries because consumers, especially in the west, have become more aware of the practices surrounding goods they buy and have a keen interest in the origins of the goods (Choudhar, 2017). Therefore, the vegan leather industry is expected to rise with the evolution of veganism. According to Grand View Research, the vegan leather industry is expected to reach $85 billion by 2025. With the evolving textile technology, consumers are preferring vegan fashion, which refers to adopting non-leather products (Grand View Research, 2019). It is predicted that vegan leather will serve as the most suitable substitute for animal leather.

Corporate social responsibility

Organizations are now emphasizing more and more on importance of sustainable activities. Corporate social responsibility plays a vital role in the business world. Corporate social responsibility is tough to achieve and requires strategic approaches to fulfill management competencies. CSR requires a lot of planning and dedication in achieving it. The entire firm stakeholders especially the workforce have to unite and set a certain goal and implement the process. Corporate social responsibility contains four core tasks: orientation, reaching common ground, performing pilots projects, and finalizing results.to achieve CSR activity your team has to be diverse must do critical thinking and strategic management. (Wesselink *et al.*, 2015)

Research Methodology

The research is based on qualitative research. Research is going to be conducted to identify the potential of cactus leather in the Pakistan leather industry. For which exploratory research will be done to understand the existing problem of the leather industry in Pakistan as well as the potential of cactus leather. In this study, qualitative methods were chosen over quantitative approaches to deeply explore perceptions and experiences related to leather manufacturing and sustainability, particularly regarding the introduction of cactus leather. Qualitative research provided nuanced insights into the subjective and contextual factors influencing decision-making and innovation in the industry, making it the most suitable approach for this exploratory study.

Research design

The type of research of our topic is exploratory research. This research is used to determine demographic survey, market segment; target population because for us it is important to understand the nature of the leather market and its manufacturers.

Research approach

An inductive approach will observe and analyze that how much the Pakistani population and leather manufacturers are aware of veganism, sustainability, and cactus leather. The inductive research will involve the search pattern and observations of manufacturers over cactus leather.

Research method

We used qualitative research to collect information through questionnaires and online data these tools helped us to gather a lot about consumer behavior. We conducted interviews with different leather manufacturers to get market awareness, leather production problems and we asked about the potential of cactus leather in Pakistan.

Population

Our target population is leather manufactures and exporters.

Sample frame

Our sample frame targets leather brands and leather manufacturers. Where we targeted some of the leather experts of Pakistan and took detailed interviews on our topic and asked them to give a personal review regarding our topic. The interviews with the experts gave us a wide knowledge of the leather industry and the ground reality in leather processing.

Research strategy and instrument of study

Interviews were conducted from leather buying house agencies; leather exporters and a thematic analysis framework is designed to analyze the responses from the interviews.

Results

Table 2
Thematic Analysis

Code Name	Descriptions	Comments
Sustainability	Leatherworking Group (Lwg)	Leatherworking Groups Are Working For The Betterment Of Tanneries And To Minimize The Solid Waste Produced By Leather Processing Factories.
Less Awareness	Cactus Leather	Our Interviewers Repeatedly Said That There Is Less Awareness Of Cactus Leather To International Buyers And Consumers.
Potential Of Cactus Leather In Future	Future Approach	Once The Final Consumer Is Aware Of Cactus Leather, The Increase In Demand Will Force Manufacturers To Produce Cactus Leather.
Customer Preference	Animal Leather	Natural Leather Is Worn In Western Countries As A Symbol Of High Status And High Fashion Products.
Corporate Social Responsibility	Benefit For The Society	Provides Health Facilities To Their Employees And Has A Goal To Reduce Carbon Footprint By 2030.
Eco-Friendly Environment	To Make The Earth Green	Working On The Betterment Of Human Nature.
Health	Safe Working Environment	Proper Sops, S Are Taken While Production And Safety Gears Are Provided To Make Sure That The Health And Lives Are Safe For The Workers And Employees.

Fig 2**:** A thematic analysis of three interviews

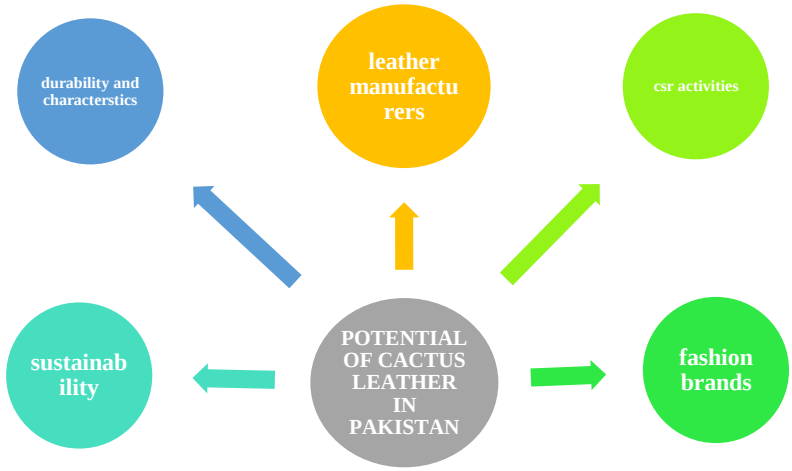
The table summarizes insights from leather industry interviews about cactus leather as a sustainable alternative. The “Leatherworking Group (LWG)” is recognized for reducing tannery

waste and promoting sustainability. A major challenge is the “low awareness of cactus leather” among international buyers, which hinders its adoption. Despite this, there is “optimism about its future” as greater consumer awareness could boost demand. The “preference for animal leather” in Western markets due to its luxury status remains a challenge. Companies are focusing on “corporate social responsibility (CSR)”, improving employee health, and reducing carbon footprints by 2030. They are also committed to an “eco-friendly environment” and ensuring a “safe working environment”. These insights highlight the need for increased awareness and promotion of cactus leather to advance industry sustainability.

Discussion, Recommendation Limitation, And Conclusion

Discussion

Figure 3
Discussion on how cactus leather is viable in Pakistan



Leather manufacturers

Cactus leather will surely benefit the leather manufacturers in Pakistan as many international buyers will be attracted to this new innovated leather. As it is eco-friendly it creates less carbon dioxide, the cost of producing cactus leather is way lesser than animal leather.it requires less water. These factors will surely help the leather manufacturers to produce leather in Pakistan (Khan, Qabool, et al., 2023)

CSR activities

In my opinion, all exporters and manufacturers working with international customers keep their corporate social responsibility sector strong. I think if leather manufacturers start giving prickly

pear cactus seeds in the deserted areas of Pakistan like Thar, Thal, Kharan desert to local people to starting farming on small scale and once the cactus is matured, they buy the leaves from them in this way they will achieve their CSR activity and will get their raw material. Secondly, this cactus plant is ideal for diabetic patients and cures diseases like obesity and high cholesterol.

Fashion brand

International fashion brands are boycotting those products which are harmful to human life and the earth. I would suggest that Pakistan's fashion brand should also come up with sustainable and eco-friendly products and use cactus leather in their product line so that they are sustainable.

Sustainability

Cactus leather is 100% sustainable as no water supply is needed, no solid waste is produced, no toxic ``chemicals are released. Cactus leather is organically grown with rainwater. The Cactus plant does not even require any specific soil condition or atmosphere it can easily be grown in deserted areas. Pakistan can easily grow sustainable cactus leather.

Durability and characteristics

According to Dessert the founder of cactus leather, these types of vegan leather can survive for 10 years, the leather is breathable, biodegradable, and skin-friendly. The feel of leather is the same as natural leather.it is easy to clean and is completely toxin-free.

Triple bottle line

The triple bottom line which is for the people, planet, and profit can only be achieved in Pakistan when manufacturers and industrialists of leather bring environmental, ethical, and economic sustainability in their production process stages. The triple bottom line can only be achieved when the companies start taking this concept seriously. I believe through cactus leather achieved these three P's people, planet and profit are comparatively easy. The reason is cactus is a sustainable product, farming it in Pakistan will increase employment and when organizations start their corporate social responsibility activities in deserted areas in Pakistan it will surely benefit the country and its people.

This idea will eliminate the solid waste and waste pollution caused by leather tanneries, which will make the company eco-friendly and sustainable for the future.

The concept will surely bring revenue as international buyers as well as locals are converting to veganism because of personal beliefs and also promote the clean and green earth concept.

Potential

Pakistan's leather industry has the potential to change the dynamics in the local market and international market. If the government supports this idea or the concept of sustainability then it will be easier for Pakistan's manufactures to compete in the international markets.

Recommendation

- To make leather tanneries sustainable enough so that it doesn't affect life on earth, so the marine life and the life on land are not affected.
- To make sustainable leather products that more and more international buyers are attracted to.
- To give awareness about cactus leather to final consumers, to create demand for sustainable products around the world.
- To give awareness about sustainability to manufacturers that how they can achieve through their production process.
- To make every leather industry follow the 17th goal of the United Nations on sustainable development so that everyone around the world is united one goal which is having sustainable earth.
- CSR activities to help the society in converting the entire nation towards sustainability, as it will help the companies to build their companies profile as well as contributing towards the communities.
- To ensure that local brands are also providing 100% eco-friendly products which will save our planet earth.
- To save Pakistan from the water crisis by limiting the water process in the manufacturing sector, this type of initiative must be taken by the government of Pakistan so that the entire country is safe from the water crisis.
- Refining waste to control environmental problems so that lives are not affected.
- To provide healthy working conditions to workers as it is the right of each individual.
- To provide safety precautions such as gloves, masks, and eye protection glasses where hazardous chemicals are used.
- Use sustainable raw material is manufacturing on the final leather product, as it will be beneficial for manufactures in the future.

- Leather tanneries should follow all sustainable Sops while processing rawhides so that international buyers do not create problems in the future.
- Natural dyes and eco-friendly chemicals must be used in the production process.
- Training to workers regarding disease prevention and training must be given.
- Protective equipment must be provided when the use of hazardous chemicals is in process.
- Tanner's pollution control must be done as solid or water waster must be purified and then decomposed at the safer location where society is not affected.

Limitations

This study has potential limitations; while conducting the research we found out some. The first is the availability of the product. Cactus leather wasn't available in Pakistan. Although Pakistan does have the potential to grow cactus (prickly pear) in different desert areas for example Thar, Thal, Kharan desert.

The second limitation concerns the lack of knowledge of some groups of Pakistani people on this particular topic. According to our research, there is a little percentage of people who are aware of veganism, sustainable products and are also practicing it in their daily lives but a majority don't have awareness. Since a lot of textile industries are moving more to sustainability day by day so there is potential for Pakistan to easily adapt this change for sustainable cactus leather.

Another limitation faced was due to COVID19; as it was lockdown for more than a year we had limited research work, we weren't able to have factory visits of different kinds of leather industries as the COVID19 situation made it impossible for the industries as well to visit outsiders or redundant people and the interviews we conducted of leather industrialists were online. Moreover, we wanted to study the tanning process deeply but were not able to do so. It was all done on a qualitative study. One of the biggest limitations is if manufacturers shift to cactus leather there will be a great loss to the economy as loss of employment, loss of investment, and loss of international leather orders. Pakistan being less advanced in the technology sector will require a lot of investment in putting up the supply chain for the cactus plant and the refining process.

Conclusion

This research aims to advance sustainability in Pakistan's leather industry by exploring the potential of cactus leather. Our study reveals significant opportunities for adopting sustainable

practices in the Pakistani market, despite the current lack of awareness among industrialists about cactus leather. Increased market awareness could lead to job creation, a reduction in cattle farming, and a shift towards cruelty-free, sustainable leather products. However, replacing traditional animal leather with cactus leather presents challenges, although sustainability remains a key trend for the future. Continued research and awareness efforts are crucial to inform both consumers and manufacturers about the benefits of eco-friendly products. With greater awareness and demand, Pakistan could see a rise in cactus leather production, aligning with global sustainability goals and contributing to a more sustainable future for the industry.

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