Heritage-Based Sustainability: Evaluating the Piran Salt Model in Sečovlje Salina Nature Park, Slovenia

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ABSTRACT

This study investigates traditional salt production at Sečovlje Salina Nature Park in Slovenia, focusing on the Piran Salt (Piranska Sol) initiative as a potential model for heritage-based sustainability. The study is set against the backdrop of accelerating climate change, biodiversity loss and cultural erosion. It explores how ecological sustainability, cultural continuity and economic resilience can be meaningfully integrated in response to these challenges. Although heritage systems are increasingly acknowledged for their value, few have been assessed using structured and multidimensional sustainability frameworks. To address this gap, the study employs a qualitative case study approach, applying both the GPM P5 Standard and the Triple Bottom Line (TBL) model. Interviews and document analysis were evaluated using five sustainability lenses: Lifespan, Servicing, Efficiency, Effectiveness and Fairness, across the domains of People, Product, Process, Prosperity and Planet. Results indicate strong sustainability outcomes. Traditional practices such as manual harvesting, *petola* maintenance, and solar evaporation promote biodiversity and reduce carbon emissions, while PDO certification and product diversification enhance market viability. Nevertheless, the system faces demographic challenges, particularly an aging workforce and limited engagement from younger generations. The study concludes that heritage-based practices can contribute meaningfully to global sustainability agendas when supported by strong governance and inclusive community participation. These practices also offer adaptable models that can be applied in other heritage landscapes.

Keywords: sustainable heritage, traditional salt production, GPM P5 framework, Triple Bottom Line (TBL), Sečovlje Salina Nature Park

INTRODUCTION

Global climate change, biodiversity loss and the increasing standardization of food systems have raised critical concerns about the long-term sustainability of industrial production models. In response, traditional place-based production systems are receiving renewed attention in academic and policy spheres. These systems are rooted in local knowledge and shaped by centuries of ecological adaptation. They offer valuable insights into sustainable resource use, cultural preservation and community resilience.

The existing literature on artisanal and heritage-based production highlights their sustainability potential. These systems often operate with low environmental impact, foster circular resource use and reinforce cultural identity (Altieri 2009; Pretty et al. 2010). While many have declined due to economic pressures, others have adapted by blending traditional practices with modern conservation strategies and market innovation.

Despite this interest, few studies have systematically assessed traditional systems across environmental, social and economic dimensions. There is limited understanding of the governance structures and institutional conditions that support their long-term viability. Much of the research remains focused on cultural preservation, with insufficient attention to how these systems contribute to broader sustainability agendas. This gap is especially pronounced in protected landscapes. These are areas where ecological, cultural, and economic interests often intersect.

To address this, the present study examines Piran Salt (Piranska Sol), a centuries old salt making tradition maintained in Sečovlje Salina Nature Park, Slovenia. This site offers a rare example of living heritage within a protected area, supported by both ecological management and formal institutional recognition. Using the Green Project Management (GPM) P5 model and the Triple Bottom Line (TBL) framework, the research evaluates the sustainability performance of the Piran Salt system across key domains.

The central research question guiding this study is: How can traditional production systems like Piran Salt serve as effective models for sustainable development when supported by strong ecological and institutional frameworks?

LITERATURE REVIEW

The sustainable preservation of traditional practices in heritage landscapes has become a central focus in recent environmental and cultural sustainability research. Scholars increasingly argue that sustainability should encompass not only technological innovation but also the continuity of cultural knowledge embedded in specific ecological contexts. Traditional production systems reflect this perspective by combining ecological stewardship with cultural resilience. Among these, artisanal salt production stands out as a practice that minimizes environmental impact while reinforcing local identity and historical continuity (Antrop, 2005; Graham et al., 2000).

Sečovlje Salina Nature Park in Slovenia offers a compelling example of this integration. Artisanal salt harvesting techniques have helped preserve both tangible heritage and wetland biodiversity. More than 270 bird species depend on habitats shaped by the salt pans, demonstrating the positive ecological outcomes of cultural continuity (Sovinc, 2013). A central element of the process is *petola*, a biologically active sediment layer that filters impurities and enriches the salt with marine minerals (Sovinc, 2016). Although the ecological importance of *petola* is well documented, limited long-term research has assessed its performance under changing climate conditions or its influence on salt yield and quality.

These findings highlight the potential of traditional systems to deliver both environmental and cultural benefits, particularly when guided by ecosystem-based knowledge. However, much of the current literature remains descriptive, focusing on outcomes without fully analyzing the systems that support them. Governance models, funding mechanisms and institutional structures are often underexplored. As a result, there is insufficient understanding of how traditional practices are maintained or adapted to today's social, economic and environmental challenges.

The revitalization of the Sečovlje salt pans is often credited to a collaborative governance model involving public agencies and the private operator Soline d.o.o. (Lužnik & Sovinc, 2007). This partnership demonstrates how environmental, economic and cultural objectives can be effectively aligned in a protected landscape. In addition, the Protected Designation of Origin (PDO) status granted to Piran Salt has reinforced its market legitimacy. PDO certification supports product differentiation, builds consumer trust and provides access to premium markets (Tregear et al., 2007; Belletti et al., 2017). Nevertheless, research remains limited on how such market mechanisms intersect with environmental responsibilities. Even less attention has been paid to the vulnerability of these systems to market shifts and changing consumer preferences.

Comparative studies also emphasize the importance of legal protection, institutional support and community participation in sustaining traditional production systems. Examples from Southeast Asia and Latin America further support this view. The Ifugao and Honghe Hani rice terraces, for instance, rely on local water management, indigenous knowledge and traditional governance to maintain both productivity and cultural

value (Soriano & Herath, 2018; Xuan Gao, 2017). In Northeast India, the Apatani and Angami communities sustainably manage land and forests through collective decision-making and customary institutions (Pulamte, 2009). These cases suggest that long-term success depends on inclusive governance, community knowledge, and equitable benefit-sharing (Maharjan et al., 2025). However, the academic literature remains fragmented, with few studies offering integrated assessments of environmental, cultural, and economic sustainability.

This study aims to address that gap by applying both the Triple Bottom Line (TBL) and Green Project Management (GPM) P5 frameworks to evaluate the Sečovlje salt production system. By combining these tools, the research assesses how the model supports environmental stewardship, cultural continuity and economic resilience within a protected heritage landscape.

METHODOLOGY

Evaluation Framework and Analytical Tools

This study uses an integrated methodology that combines the GPM P5 Standard, the Triple Bottom Line (TBL) model, and the United Nations Sustainable Development Goals (SDGs) to assess the sustainability of the Piran Salt system. These frameworks were selected for their ability to provide a multidimensional analysis that includes social, environmental, economic and cultural dimensions.

The GPM P5 Standard evaluates sustainability across five core domains: People, Product, Process, Prosperity, and Planet. Each domain is assessed through five analytical lenses: Lifespan, Servicing, Efficiency, Effectiveness, and Fairness. These lenses examine how a system functions over time, serves its users, operates within ecological boundaries, and upholds ethical principles. This multidimensional structure allows for a holistic sustainability assessment that captures both operational and cultural dimensions. The flexibility and comprehensiveness of the model make it especially well-suited for analyzing traditional heritage-based systems such as the Piran Salt process, where natural, economic, and social dynamics are deeply interconnected.

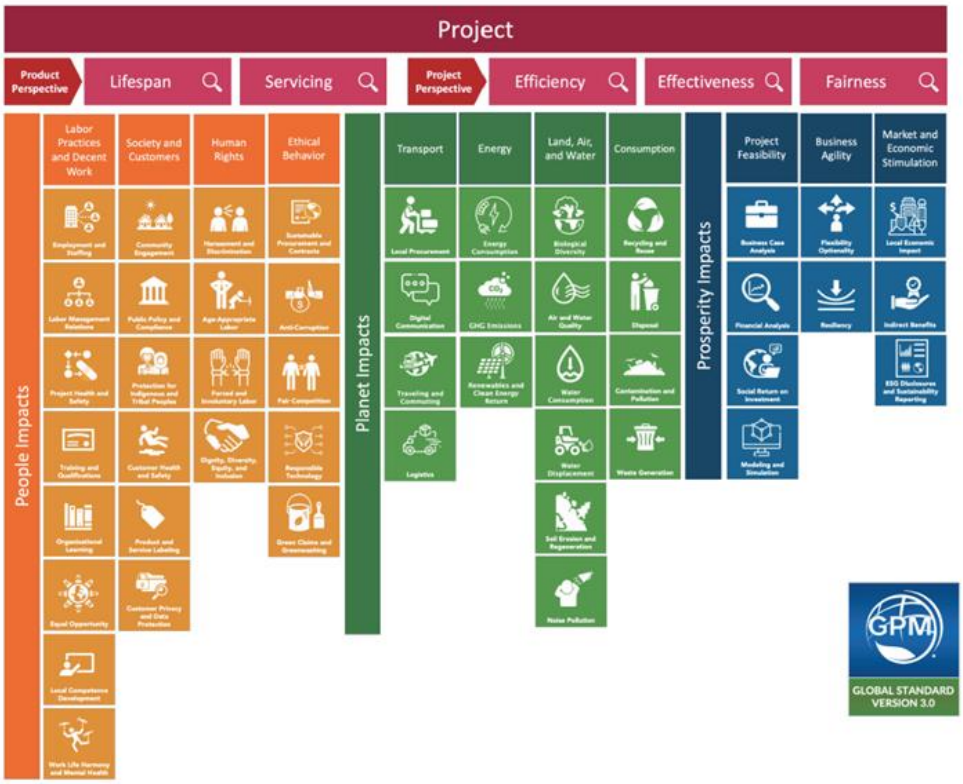

Figure 1. GPM P5 Ontology. A multidimensional sustainability framework that evaluates impacts across five domains (People, Product, Process, Prosperity, and Planet) using five analytical lenses. This structure supports detailed assessment of performance across social, economic, and environmental dimensions.

To further contextualize the impacts, the findings were organized according to the Triple Bottom Line (TBL) model. This framework categorizes sustainability into three core dimensions: social, environmental, and economic. Mapping the P5 domains onto these categories clarified how the salt system contributes to specific pillars of sustainable development.

To enhance the practical relevance of the analysis, the Triple Bottom Line model was layered onto the P5 framework. The TBL approach categorizes sustainability impacts into three main pillars: social, economic and environmental. This helped in organizing findings and showing how specific aspects of the salt system contribute to each sustainability dimension.

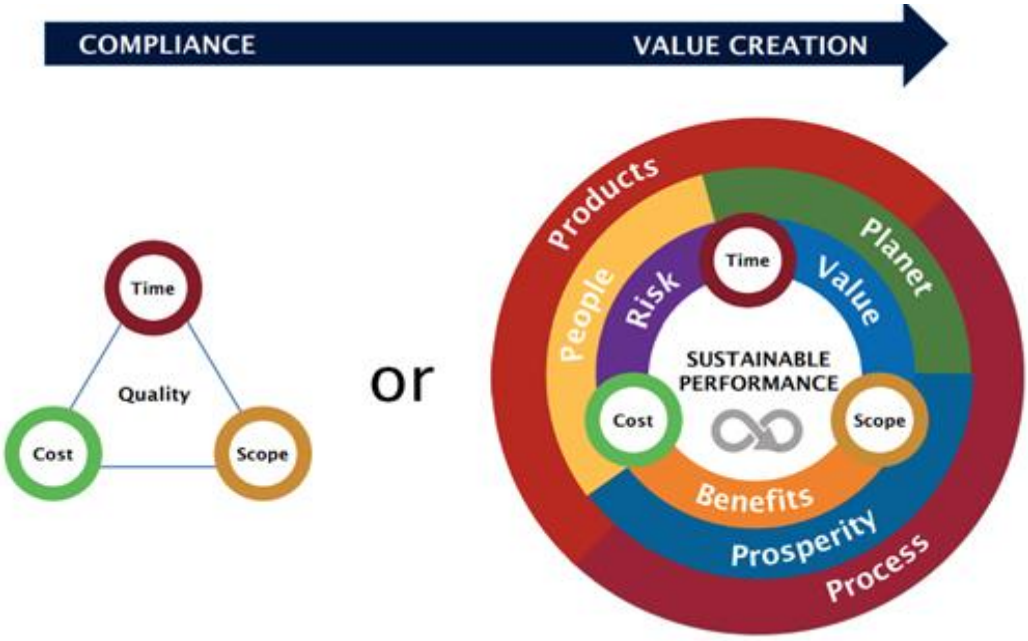

Figure 2: Evolution of Evolving from Traditional Project Delivery to Sustainable Value Creation

Lastly, the study aligned each sustainability impact with relevant UN SDGs. This allowed the results to be positioned within a global policy context and highlighted the contributions of traditional ecological knowledge to international development goals such as SDG 8 (Decent Work and Economic Growth), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action).

Figure 3: The Sustainable Development Goals -17 Global Goals under the 2030 Agenda for Sustainable Development (UN, 2015).

Data Collection Methods

This study employs a qualitative case study approach to evaluate the sustainability performance of traditional salt production at Sečovlje Salina Nature Park in Slovenia. The analysis is guided by two complementary frameworks: the Green Project Management (GPM) P5 Standard and the Triple Bottom Line (TBL) model. Together, these provide a comprehensive structure for assessing environmental, social and economic outcomes while acknowledging the cultural and ecological uniqueness of heritage-based systems (Elkington 1997; Silvius and Schipper 2014; Carboni, 2023).

Data for the evaluation were collected through multiple qualitative methods. These included:

- **Document analysis** of official management plans, policy reports, historical archives and branding materials
- **Semi structured interviews** with tourism officials and heritage specialists
- **Informal interview** with a sales representative at the Piran Salt outlet, conducted during product purchase. This interaction provided firsthand insight into brand communication, customer engagement, and how traditional narratives are conveyed at the point of sale.
- **Internal evaluations and unpublished reports** provided by local institutions and NGOs

All data sources were reviewed to understand both formal governance structures and informal community practices that influence the functioning of the salt system.

Data Analysis Process

The qualitative data collected in this study were analysed using thematic coding to identify key sustainability impacts related to the Piran Salt system. These impacts were first organized according to the five domains of the GPM P5 Standard: People, Product, Process, Prosperity and Planet. Within each domain, further classification was conducted using five analytical lenses: Lifespan, Servicing, Efficiency, Effectiveness and Fairness. This framework enabled a structured and multidimensional assessment of sustainability grounded in both cultural and environmental context.

To further enhance interpretive clarity, the identified impacts were mapped onto the Triple Bottom Line (TBL) framework, which categorizes outcomes into social, environmental and economic sustainability dimensions. This step allowed for a clearer understanding of how each domain contributed to broader sustainability goals and decision making.

In the final stage, each impact was matched with one or more relevant targets from the United Nations Sustainable Development Goals (SDGs). Official SDG indicators were used as a reference to ensure consistency with global sustainability benchmarks. This alignment helped bridge local practices at Sečovlje Salina with international development priorities, including SDG 8 (Decent Work and Economic Growth), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action).

To increase accessibility and communicative value, findings were presented using visual tools, including a sustainability integration matrix (Figure 4) and a domain-wise summary table (Table 1). These tools allow for clearer interpretation by policymakers, cultural heritage managers and sustainability researchers. They also help to highlight specific leverage points for strengthening ecological performance, cultural continuity and economic inclusion within heritage-based sustainability systems.

Table 1 summarizes the key strengths, weaknesses, and opportunities identified across the five P5 domains. This structured overview provides a concise synthesis of the sustainability assessment and supports informed planning, communication, and strategy development.

Table 1. Sustainability Summary by P5 Domain

People	Heritage knowledge, ethical labor standards	Aging workforce, lack of training pathways	Youth engagement, apprenticeships
Product	Branding, authenticity, PDO certification	Low scalability, undocumented techniques	Digital documentation, diversification
Process	Zero emissions, biodiversity, cultural integrity	Climate dependency, labor intensity	Ergonomic tools, climate adaptation
Prosperity	Financial sustainability, brand strength	Limited benefit sharing, youth exclusion	Cultural entrepreneurship, SME inclusion
Planet	Biodiversity protection, zero emissions	Minimal monitoring, low public awareness	Education, monitoring partnerships

RESULTS

The study reveals strong sustainability performance across the five domains of the GPM P5 framework: People, Product, Process, Prosperity and Planet. This evaluation was conducted using five analytical lenses: Lifespan, Servicing, Efficiency, Effectiveness and Fairness. These lenses help capture both the strengths and areas of vulnerability within each domain. The assessment draws upon evidence gathered from stakeholder interviews, internal reports and relevant literature, as outlined in the methodology section.

To present a clear overview, the following matrix synthesizes key findings across the P5 domains. It also highlights alignment with the Sustainable Development Goals (SDGs) and reflects integration with the Triple Bottom Line (TBL) dimensions of social, environmental and economic sustainability.

This following matrix illustrates the intersection of the GPM P5 sustainability domains (People, Product, Process, Prosperity and Planet) with key analytical lenses (Lifespan, Servicing, Efficiency, Effectiveness and Fairness) and the Triple Bottom Line dimensions of sustainability (Social, Economic and Environmental). Each impact area is also linked to relevant United Nations Sustainable Development Goals (SDGs), including but not limited to SDG 8 (Decent Work and Economic Growth), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action). The integrated framework underscores the Piran Salt system's holistic sustainability, demonstrating how heritage-based practices can generate globally relevant, culturally grounded and ecologically responsible development outcomes.

P5 Domain	Analytical Lens	Key Impact Description	TBL Dimension	Aligned SDGs
	Lifespan	Declining artisanal labour threatens continuity; minimal youth engagement.	Social	
	Servicing	Traditional skills passed informally; limited formal training structures.	Social	
	Fairness	Underrepresentation of youth; gender equity and mental health gaps.	Social	
	Lifespan	Strong cultural relevance and product quality supported by PDO status.	Economic	
	Servicing	Reliance on seasonal knowledge and artisanal tools limits scalability.	Economic	
	Efficiency	Fully renewable, low-emission production process; weather-dependent.	Environmental	
	Effectiveness	Culturally and ecologically effective, but output is manually constrained.	Environmental	

	Fairness	Economic benefits concentrated; equitable labor access remains limited.	Social	
	Feasibility	High financial self-sufficiency with minimal subsidies.	Economic	
	Business Agility	Spa/wellness diversification strengthens resilience.	Economic	
	Market Impact	Supports regional employment, local supply chains, branding.	Economic	
	Emissions	Zero fossil fuel use; solar and wind-driven production.	Environmental	
	Land & Water	Non-invasive methods preserve biodiversity and air/water quality.	Environmental	
	Waste	Closed-loop system through *petola*; no chemical waste.	Environmental	
	Transport	Local sourcing reduces emissions; promotes circular economy.	Environmental	

Figure 4: The Piran Salt Sustainability Integration Matrix

The Piran Salt Sustainability Integration Matrix provides a comprehensive view of how the Sečovlje Salina initiative supports global sustainability objectives. By integrating the GPM P5 framework with the SDGs and the TBL model, the matrix demonstrates that sustainable heritage-based production is not only ecologically sound but also promotes cultural continuity, inclusive participation and local economic resilience.

Each domain of the P5 framework reflects specific sustainability contributions:

a) People

This domain assesses the social and cultural sustainability of the Piran Salt system. The workforce is composed mainly of aging artisans, many of whom possess deep traditional ecological knowledge passed down over generations. While this knowledge is highly valuable, it is transmitted informally and is at risk of being lost as younger generations show limited interest in the practice.

Labor conditions are ethical and safe, supported by institutional oversight and alignment with PDO standards. However, the physical demands of the work and its seasonal, low-wage structure make recruitment of younger workers difficult. This has implications for both long-term labour sustainability and intergenerational continuity of knowledge.

To address these challenges, a more formalized system of apprenticeship and training could help attract and retain younger workers. Partnerships with vocational institutions, ergonomic innovation and public campaigns celebrating artisanal heritage could support social sustainability.

b) Product

The product domain focuses on the quality, authenticity and cultural significance of Piran Salt. The salt is protected under the Protected Designation of Origin (PDO) certification, which safeguards its artisanal character and enhances its market appeal. This status reinforces its brand as a traditional, hand-harvested and eco-ethical good with a distinct geographical identity.

However, the tools, techniques and craftsmanship involved in producing this high-quality salt are not well-documented, making knowledge transfer difficult. The process is deeply embedded in tacit knowledge and hands-on experience, which limits its scalability and replication elsewhere.

The premium nature of the product supports market differentiation and tourism appeal. Still, the production remains limited in volume due to manual labor constraints and environmental dependencies.

c) Process

This domain evaluates the methods and techniques used in salt production, focusing on their environmental impact, resilience and cultural embeddedness. The Piran Salt process is fully manual and relies on renewable solar and wind energy for evaporation, resulting in a near-zero-emission production cycle. The preservation of *petola* (a living biofilm on the salt pans) is a unique ecological practice that reflects deep local knowledge and supports biodiversity.

However, the process is highly dependent on seasonal weather conditions and microclimatic stability, making it vulnerable to climate variability. Moreover, its intensive physical labor requirements and the need for constant maintenance limit its scalability.

Despite these limitations, the process achieves exceptional results in environmental effectiveness and cultural integrity. It serves as a living example of how low-tech, traditional systems can operate within planetary boundaries.

d) Prosperity

This domain considers the economic sustainability and long-term viability of the Piran Salt initiative. Despite minimal subsidies, the operation has remained financially self-sustaining through a diversified business model that includes artisanal salt production, spa services, cultural tourism and branded product sales.

However, economic benefits are concentrated among a limited number of operators and opportunities for local small enterprises or youth startups remain underutilized. There is potential to expand economic inclusion through partnerships with local artisans, food cooperatives and cultural entrepreneurs.

The Piran Salt brand leverages its authenticity and ecological value to attract premium markets and visitors. Its unique position at the intersection of culture, nature and commerce offers a model for low-impact, place-based economic resilience.

e) Planet

The Planet domain assesses the ecological sustainability of the Piran Salt system. The site is located within a protected wetland and Natura 2000 area, contributing to biodiversity conservation, climate resilience and habitat preservation. The salt-making process produces no emissions or chemical waste and is powered entirely by natural evaporation through sun and wind.

The maintenance of *petola* not only ensures salt quality but also sustains a micro-ecosystem that benefits aquatic and avian species. This makes the system an exemplary case of traditional ecological knowledge supporting modern conservation goals.

However, formal environmental monitoring is minimal and broader community understanding of the ecosystem services provided remains limited. Strengthening these aspects could improve long-term environmental stewardship. Importantly, these achievements are not the result of environmental engineering alone. They are the product of centuries of accumulated artisanal wisdom, cultural tradition and community stewardship. Fully understanding the environmental success of the Piran Salt system requires acknowledging the deep interdependence between ecological integrity and cultural heritage.

Cultural Significance and Heritage Value

Cultural sustainability lies at the heart of the Piran Salt initiative. The salt pans at Sečovlje are not merely production sites but living expressions of regional identity and heritage. For over 700 years, artisanal salt making has been preserved and practiced. It has maintained knowledge systems, traditional tools and unique techniques that are deeply rooted in the local context. These practices are formally recognized as national cultural property due to their ethnographic, historical and environmental importance.

The physical infrastructure, including canals, levees and stone salt houses, embodies a longstanding tradition of sustainable land management. It demonstrates how human activity can harmoniously coexist with ecological systems. This cultural landscape reflects centuries of adaptation and innovation in response to coastal environmental conditions.

Cultural transmission remains active and participatory. Festivals, guided educational programs and the Salt Museum play a key role in making heritage visible and meaningful to both local communities and international visitors. Far from being a static tradition, salt making at Sečovlje continues to evolve through community engagement, reinterpretation and creative expression.

Symbolically, salt represents themes of purity, resilience and identity. These values are deeply embedded in local narratives and have been celebrated across generations. This enduring cultural resonance enhances not only social cohesion but also encourages a sense of stewardship toward the natural environment. The integration of tradition into everyday life supports a model of cultural sustainability that is both resilient and forward looking.

Building on this cultural foundation, the evolution of Piran Salt into a commercial brand exemplifies how heritage can be leveraged to create meaningful and sustainable economic opportunities.

Brand Heritage and Commercial Identity

The transformation of Piran Salt from a traditional artisanal practice into a recognized commercial identity has been carefully managed to preserve its cultural roots while engaging contemporary markets. The product's Protected Designation of Origin (PDO) certification plays a central role in maintaining its authenticity. It links the salt to its geographic origin, manual production methods and historical relevance. This foundation of cultural integrity supports its position in premium culinary and wellness sectors.

Rather than eroding its heritage, commercialization has enhanced public awareness and created diversified income sources. Initiatives such as the Lepa Vida Thalasso Spa and eco-tourism experiences within the Sečovlje Salina Nature Park have introduced new economic dimensions to the salt pans. These additions offer visitors a tangible connection to the landscape and traditions, reinforcing the brand's identity through direct experience.

Marketing strategies further strengthen this identity by emphasizing storytelling, environmental ethics and place-based authenticity. Through carefully curated packaging, visitor interpretation and educational programs, Piran Salt becomes more than a product as it becomes a cultural experience. This alignment between tradition and innovation demonstrates how heritage-based enterprises can thrive in modern markets without compromising their core values.

Ultimately, the Piran Salt brand illustrates the potential for traditional practices to support sustainable development. By combining cultural significance with market relevance, it offers a model for balancing conservation, economic viability and contemporary consumer engagement.

This transformation is reflected in the development of four core brand pillars that together represent the evolving identity of Sečovlje Salina. These brands not only preserve the site's historical and ecological value but also expand its relevance through wellness, tourism and product innovation. The table below summarizes their functions and identities.

Table 2: Illustrative four core brand pillars of Sečovlje Salina.

Logo	Brand	Description
	KPSS (Sečovlje Salina Nature Park)	Represents the protection of the salt pans as a natural and cultural heritage site.
	Piranske Soline	A brand for hand-harvested salt and related products made with traditional methods.
lepa vida	**Lepa Vida Natural Cosmetics**	Skincare products made with salt and minerals from the salt pans.
lepa vida	**Lepa Vida Thalasso Spa**	An outdoor spa offering salt-based treatments in a natural setting.

DISCUSSION

The Sečovlje Salina Nature Park and the Piran Salt production system illustrate a compelling case where tradition, sustainability and innovation intersect. Through the application of the GPM® P5™ Standard and the Triple Bottom Line (TBL) framework, this study reveals how cultural heritage can become a driving force for sustainable development across environmental, social and economic domains.

Sustainability Through Tradition

Contrary to the notion that sustainability requires abandoning the past, this case demonstrates the value of traditional practices. Techniques such as the use of *petola*, manual harvesting and solar driven evaporation can meet or even exceed modern environmental standards. These methods significantly reduce emissions, preserve biodiversity and eliminate the need for mechanization. As such, they validate the Planet and Process domains of the P5 model while aligning with the environmental pillar of the TBL framework.

The Importance of Institutional and Market Integration

The success of Piran Salt cannot be credited to tradition alone. Its revival and continued operation have been made possible through strong institutional backing and strategic market positioning. The Protected Designation of Origin (PDO) certification has helped build trust in the product. In addition, cooperation between Soline d.o.o. and public authorities has provided stable and consistent governance. These institutional frameworks support the Prosperity domain by anchoring traditional practices within viable economic ecosystems.

Labor and Demographic Vulnerabilities

While cultural pride and job creation have reinforced the People domain, long-term sustainability is threatened by workforce challenges. Salt harvesting is physically demanding and younger generations show limited interest in entering this line of work. This generational gap highlights the urgent need for labor innovations and youth-oriented engagement strategies to secure knowledge transfer and operational continuity.

Cultural Identity as an Ecological Asset

Cultural heritage is not just symbolic. It actively supports conservation. The community's emotional attachment to salt-making reinforces ecological responsibility. Events such as salt festivals, educational programs and the presence of the Salt Museum contribute to the living heritage and ensure intergenerational transmission. This synergy between cultural pride and environmental stewardship shows how intangible heritage can amplify sustainability goals.

Framework Validation and Broader Applicability

This study applies both the P5 and TBL frameworks to reveal complex relationships that traditional evaluation models may overlook. The P5 lenses including Lifespan, Servicing, Efficiency, Effectiveness and Fairness highlight specific strengths and vulnerabilities. Meanwhile, the TBL framework provides a balanced view across environmental, social and economic aspects. Together, this dual framework offers a practical model for evaluating other heritage-based sustainability projects around the world.

Scalability and Adaptation of the Piran Salt Framework

Although rooted in the specific context of Sečovlje Salina, the Piran Salt model presents transferable elements adaptable to other settings. These include low-impact, climate-resilient practices, strong community participation and institutional support such as heritage certifications. Comparable approaches are evident in the Ifugao Rice Terraces in the Philippines and the alpine dairy cooperatives in Switzerland, where traditional knowledge is integrated into formal governance structures.

The combined application of the GPM P5 and Triple Bottom Line (TBL) frameworks provides practical tools for assessing and adapting heritage-based models to diverse local conditions. This dual-framework approach supports the broader replication of culturally grounded and sustainable practices worldwide.

Moving Toward Strategic Action

These findings highlight that cultural heritage, when supported by effective governance and market frameworks, is not a relic of the past. Instead, it serves as a dynamic and valuable resource for resilience, innovation and regeneration. However, maintaining and expanding the impact of such initiatives requires deliberate support and strategic planning. The following section outlines targeted policy recommendations to strengthen and scale the sustainable outcomes of heritage-based systems such as the Piran Salt initiative.

POLICY RECOMMENDATIONS

Based on the findings from the Sečovlje Salina Nature Park and the Piran Salt production system, the following policy recommendations are proposed to enhance the sustainability, scalability and long-term resilience of heritage-based production systems.

Institutional Support and Policy Integration

National and regional governments should formally recognize heritage-based production systems as contributors to sustainable development. This includes integrating these systems into cultural, environmental and rural development policies. Sustained support through grants, conservation incentives and inclusion in national tourism strategies will help maintain operational viability.

Labor Innovation and Youth Engagement

To ensure long-term labor sustainability, the Piran Salt initiative must attract youth and lower entry barriers. Cultural apprenticeship programs in collaboration with schools, NGOs and heritage institutions can offer accredited training and clear career pathways. Introducing ergonomic tools and mobile platforms reduces physical strain, especially for women and older workers. Public campaigns can celebrate salters as cultural

stewards. Strengthening knowledge transfer and improving work conditions will empower youth and preserve the salt-making tradition.

Inclusive Economic Participation

Policies should encourage broader community involvement in the value chain. This includes supporting small entrepreneurs who produce complementary products such as herbal infusions, crafts or natural cosmetics linked to Piran Salt. Capacity-building workshops and micro-financing schemes can help underrepresented groups participate meaningfully in the economic ecosystem.

Sustainable Tourism Integration

Governments and local stakeholders should enhance infrastructure and marketing for cultural and ecological tourism related to salt heritage. This includes promoting the Salt Museum, wellness tourism offerings and educational trails. Clear visitor guidelines and environmental monitoring should be implemented to protect the fragile ecosystem from over-tourism.

Branding and Certification Enhancement

To ensure authenticity and consumer trust, additional heritage-linked certifications or labels may be introduced beyond the Protected Designation of Origin. Policymakers should support the international recognition of such labels and facilitate market access for heritage-based goods in global sustainability-oriented markets.

Environmental Monitoring and Climate Adaptation

Policy frameworks should support ongoing research and environmental monitoring of artisanal salt systems, particularly under changing climatic conditions. Adaptive planning tools and early warning systems can help producers adjust operations during extreme weather thereby improving long-term climate resilience.

Data Transparency and Reporting

Encouraging producers to adopt Environmental, Social and Governance (ESG) reporting or simplified sustainability metrics can build trust with stakeholders and improve decision making. Policymakers can incentivize transparency through reporting grants or preferential procurement policies.

International Cooperation and Knowledge Exchange

Facilitating partnerships with similar heritage-based production systems globally can encourage mutual learning and innovation. Governments can promote participation in international forums, UNESCO heritage programs or EU-funded cultural and environmental projects.

CONCLUSION

This study demonstrates how a culturally rooted heritage system like Piran Salt can be evaluated through an integrated sustainability framework that combines the GPM P5 Standard, the Triple Bottom Line model and alignment with key United Nations Sustainable Development Goals. By applying these tools, the analysis reveals the multidimensional value of traditional salt making, including its contributions to biodiversity, cultural continuity and low impact economic development.

The findings show that the Piran Salt system excels in environmental and cultural effectiveness, yet faces challenges related to labour continuity, scalability and formal monitoring. Addressing these gaps through education, ergonomic innovation and inclusive economic models can strengthen long term viability and ensure intergenerational sustainability.

Importantly, this framework is not limited to the Slovenian context. The study offers actionable guidance for replicating the model in other ecological and cultural settings worldwide. It highlights that heritage practices,

when supported by strategic policy and innovation, can offer scalable solutions to today's sustainability challenges.

Ultimately, the Piran Salt system serves as a living example of how the past can inform the future, where heritage, ecology and economy converge to support a resilient and inclusive development pathway.

Suggestions for Future Research

Future research should investigate traditional production systems across diverse ecological and cultural contexts. Comparative studies can identify key success factors and context-specific challenges, offering valuable insights for replicating sustainable heritage practices in other regions. Longitudinal research would also be beneficial in examining how initiatives like the Piran Salt production system adapt over time to climate variability, labour market dynamics and changing consumer preferences.

Further exploration is needed into the ecological functions of *petola*, particularly its performance under extreme weather conditions and its role in enhancing both the yield and quality of salt production.

Research should also examine the integration of heritage-based production methods into modern supply chains. This includes evaluating potential trade-offs related to equity, authenticity and environmental impact as traditional systems scale within contemporary markets.

Lastly, future studies should adopt participatory and community-engaged research approaches. Involving local stakeholders in the co-creation of sustainability strategies ensures that outcomes are contextually grounded, culturally relevant, and supportive of long-term resilience and inclusive development.

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