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Sustainability and Economic Stability in the Management of Penal Institutions

Summary

The development of agricultural integration and the sustainability challenges of prison food supply raise key issues in modern agribusiness. This study aims to present an economic model that analyzes the interconnections between correctional institutions' food supply systems and producer integration. The constant demand and long-term contracts provide local producers with access to a stable market while reducing supply chain costs and environmental impact. The analysis employs the BATWOVE methodology to assess the effectiveness of sustainable public procurement strategies and innovative integration models, highlighting that deeper integration of food systems not only brings economic benefits but also fosters the long-term sustainability of agricultural producers and promotes social justice.

Keywords: sustainability, inmate nutrition, producer integration, BATWOVE, economic stability

JEL codes: Q13, Q18, H83

Introduction

The history of agricultural integration spans thousands of years, during which collaboration among producers, processors, and traders has gradually improved the efficiency of food supply chains. In modern economies, integration has become a fundamental tool for enhancing cost efficiency and market competitiveness. In end-consumer markets, such as prison food supply, stable demand provides an opportunity for small and medium-sized enterprises (SMEs) to leverage the benefits of demand-driven production over the long term.

Modern agricultural integration, primarily driven by cost reduction and competitiveness, has evolved through global trade relations and logistical advancements. However, SMEs often struggle to capitalize on these opportunities, particularly in the food supply markets of correctional institutions, despite the economic advantages that stable demand can offer (Bijman, 2012).

Prison food supply systems represent a consistent demand market, which can be highly beneficial for local producers. This predictability ensures a steady revenue stream, allowing farmers to develop long-term production strategies. An integrated approach not only reduces costs but also enhances the sustainability of the supply chain.

The key challenge, however, lies in successfully integrating local producers into this system. Current public procurement regulations often prioritize the lowest price, which can hinder the development of sustainable procurement strategies. However, the European Union's sustainable procurement directives provide opportunities to implement more sustainable purchasing solutions.

Sustainable Food Systems

Sustainable food systems aim to address the challenges of food production, distribution, and consumption in a way that supports environmental, social, and economic sustainability (Moscatelli et al., 2016; Çakmakçı et al., 2023). However, implementing these principles in institutional settings, such as correctional facilities, presents unique challenges. These institutions often operate within closed supply chains, where procurement options are limited, and specific dietary requirements must be met (Rohmer, 2019). Additionally, strict budget constraints and operational regulations influence the feasibility of sustainability initiatives (Oglethorpe & Heron, 2013)

Research by John Ingram and Monika Zurek highlights that food systems often fail to prioritize sustainability, a pattern also evident in penal institutions. This study hypothesizes that integration plays a crucial role by allowing these institutions to function not only as consumer markets but also as active participants in sustainable food production and supply chains. The primary objective of this study is to develop an economic model demonstrating how penal institutions can meet their food supply needs in a sustainable and cost-effective manner through producer integration (Johnson & Lee, 2019). The model emphasizes reducing supply costs, ensuring long-term market opportunities for local producers, and fostering the sustainable operation of correctional facilities.

By analyzing the relevant legal framework, this study aims to identify the factors shaping cooperation opportunities between domestic producers and penal institutions. Special attention will be given to competition law and public procurement regulations governing state purchases (Taylor, Brown, & Green, 2021). Additionally, the study will explore legal and economic barriers that currently limit integration, as well as strategies to ensure regulatory compliance and promote transparency (Adams, 2018).

The complexity and sustainability of food systems are receiving increasing attention at both global and local levels. As Ingram (2020) emphasizes, the various stages of the food supply chain – from production to consumption – are closely interconnected, requiring an integrated approach that balances social, economic, and environmental considerations.

Incorporating local food producers into the penal institution food supply system brings significant benefits, including economic support for local farmers, improved nutrition for inmates, and a reduction in environmental impact (Benedek & Fertő, 2015; Szente, Fertő & Benedek, 2021). The intercon-

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nection between different stages of the food supply chain – from production to consumption – necessitates an integrated approach to social, economic, and environmental aspects (Ingram, 2020).

According to the USDA Economic Research Service, there is no unified definition of „local" or „local food systems" in terms of the geographic distance between production and consumption (Martinez et al., 2010).

Local food hubs are emerging as innovative agreements that connect small-scale producers with consumers and large buyers, potentially addressing sustainability challenges within traditional agri-food systems (Berti & Mulligan, 2016). However, expanding local food distribution often requires leveraging existing traditional infrastructure, which poses challenges in maintaining producers' economic viability and ensuring consumer accessibility (Bloom & Hinrichs, 2011).

Research on the food systems of penal institutions highlights opportunities for integrating local food production and supply chains. The fundamental principles of sustainable food systems -such as utilizing local resources, incorporating seasonal foods, and optimizing waste management – are particularly important in the operation of penal institutions. These institutions have unique conditions that allow for the practical application of these principles while contributing to environmental burden reduction and supporting local economies.

The food supply in penal institutions presents a complex challenge that involves legal, nutritional, and operational considerations. Historically, the food supply of correctional systems has evolved alongside social changes (Moor & Makarova, 2021). While prison administration aims for efficiency, it must also balance this goal with inmates' fundamental right to adequate nutrition, which includes respecting cultural, religious, and ethical dietary needs (Locchi, 2021).

The direct beneficiaries of food supply in penal institutions are inmates and staff. Ensuring the provision of food in sufficient quality and quantity is essential for preserving health and upholding fundamental human rights (Food Matters, 2024).

In Hungary, the daily food supply for approximately 19,000 inmates and an equal number of staff is of paramount importance. This large number of stakeholders generates a significant and predictable demand for raw materials. Through an integrated approach, not only can producers achieve stable and secure revenue, but correctional institutions may also experience reduced shortages of essential supplies. The research hypothesis suggests that integrated solutions facilitate the development of a cost-effective and sustainable food system in penal institutions.

Suppliers and producers are key implementers of the process, significantly influencing the efficiency of the system. Their cooperation is crucial for maintaining a stable food supply chain (Gajdic, 2022). The European Union's sustainable public procurement directives create new opportunities for involving local producers and establishing short supply chains. Furthermore, digitalization and intelligent food logistics systems can enhance efficiency (Czener & Bagotyán, 2023).

One of the biggest challenges in prison food supply is overcrowding, which complicates the provision of meals in both quality and quantity. Overcrowding not only worsens living conditions but also negatively impacts the quality and quantity of food provided (Arsboni, 2014).

The EU's sustainable public procurement directives offer the potential for penal institutions to adopt environmentally friendly solutions, thereby reducing the system's ecological footprint (Treaty on the Functioning of the European Union, Articles 26, 34, 53(1), 56, 57, 62, and 114). Sustainability considerations are playing an increasingly important role in the development of food sources for penal institutions. Involving local producers and creating short supply chains can reduce environmental impact and enhance food security. Future strategies include the use of renewable energy sources in internal production systems and closer cooperation with local communities (European Commission, 2024).

The regulatory framework significantly influences producer integration and supply chains across various sectors. In the dairy industry, market liberalization and contractual relationships challenge farmers' collective rights, necessitating adaptation strategies based on regional production models (Dervillé & Fink-Kessler, 2019). Public food procurement programs can influence consumption and production patterns, but their potential often remains underutilized due to the absence of favorable regulatory frameworks (Swensson & Tartanac, 2020).

In public procurement processes, preference can be given to products originating from short supply chains, produced in an environmentally friendly manner, or supporting local economies (Bijman, 2012). Smaller farmers can utilize shared logistics solutions, enabling them to meet larger volume demands (Raynolds, 2004).

Transparent, multi-year contracts create a stable market for local producers while reducing price and demand fluctuations (Pretty, 2008). From a farming perspective, economic growth is an advantage, achieved through stable demand and long-term contracts. This ensures predictable revenue, facilitating farmers' investments (Kotler, 2011). Closer integration of local farmers reduces market uncertainties and increases competitiveness (Bijman, 2012). Sustainable practices support farmers' long-term viability and enhance environmental awareness (Pretty, 2008).

A key challenge in transitioning to organic production is the significant investment required for infrastructure development (Raynolds, 2004). For smaller farmers, integrating into new logistics systems and meeting higher volume demands can be difficult (Kotler, 2011). Additionally, competition regulations may limit the preferential treatment of local producers, posing further challenges (European Commission, 2014).

Sustainable Food Supply in Penal Institutions

The flexibility of food supply systems is essential for achieving sustainable development goals. As Zurek (2020) emphasizes, model-based planning and analysis can enhance adaptability to climate change. Given these factors, prison food supply systems should undergo transformation to align with sustainability objectives.

In recent decades, healthy nutrition has gained prominence in the development of food systems in penal institutions. However, sustainability has yet to become a central focus. Prison food supply systems, however, offer a unique opportunity to implement the LOHAS (Lifestyles of Health and Sustainability) approach, which promotes healthy eating, sustainable farming, local producer support, and efficient resource use (Raynolds, 2004; Kotler, 2011).

Beyond supporting sustainability goals, this approach also provides long-term economic benefits, particularly for smaller agricultural producers. The stable demand of penal institutions presents an opportunity to establish long-term sustainable supply chains, fostering local economic development and social integration. The current price-driven prison food system is shifting toward an integrated model that balances sustainability, economic viability, and social responsibility (Hoek et al., 2021).

Method

BATWOVE Analysis in Penal Institutions

The transformation of penal institutions into integrated food systems offers significant economic and sustainability benefits. Baker (2021) argues that prisons generate predictable demand, creating long-term market opportunities and financial stability for local producers. Similarly, Evans (2020) highlights that incorporating sustainability policies into procurement enhances the efficiency of correctional food systems while reducing environmental impact.

Foster (2018) emphasizes that integrated systems rely on economic and environmental factors, promoting sustainable development and social responsibility. Shortening supply chains lowers logistics costs and minimizes transportation-related environmental impact (Benedek, 2014). This approach strengthens local economies by fostering direct connections between producers and consumers.

For smaller farmers, such a system ensures stable and predictable market conditions, enabling long-term planning and economic sustainability (Goncalves & Maximo, 2023). By reducing market uncertainty, it also fosters rural economic development and social cohesion (Mohácsi, 2022).

To analyze these dynamics, BATWOVE analysis serves as a crucial tool for developing integrated economic models. This framework allows for an in-depth examination of key factors, trade-offs, and interconnections, helping to assess the feasibility and sustainability of economic decisions. Beyond financial aspects, BATWOVE analysis incorporates social and environmental dimensions, making it essential for evaluating integration models in penal institutions.

A detailed stakeholder analysis is critical for the successful implementation of food supply integration. The BATWOVE framework provides a structured approach to identifying relationships, interests, and challenges within the system. Ingram (2020) underscores the importance of stakeholder collaboration in building sustainable food systems, while Zurek (2020) highlights the need for flexibility and adaptation to address future challenges.

Stakeholder Analysis in Penal Institution Food Supply

The primary objective of stakeholder analysis is to define each party's role within the system and understand their interests. Stakeholders – such as producers, catering service providers, regulators, and consumers – often have diverging or even conflicting priorities. Therefore, identifying common goals is essential to fostering cooperation. By enhancing transparency and structuring interests, stakeholders can align their individual objectives with the system's broader sustainability and economic goals.

Beyond identifying interests, it is crucial to prioritize them. For example, local producers may seek a stable demand, while prison administrations may focus on cost efficiency and logistical optimization. Balancing these priorities is key to developing an integrated and sustainable food supply system that benefits both producers and correctional facilities.

Procurement processes should prioritize local and sustainable food sources, ensuring long-term economic and environmental benefits. Policymakers play a critical role in shaping the future of penal institution food systems by implementing regulations that promote short supply chains and sustainable farming practices. Their decisions influence the feasibility of integrating local farmers, reducing food transportation emissions, and fostering economic stability in rural communities.

Beneficiaries

Inmates

Providing healthier, more nutritious meals improves inmates' physical and mental well-being, supporting rehabilitation and easing social reintegration (Collins & Harris, 2020). Proper nutrition upholds human dignity and enhances institutional efficiency while reducing long-term healthcare costs for society.

Local farmers

Integrated food supply systems in penal institutions create stable and predictable demand, fostering the sustainable growth of rural economies (Baker, 2021). Long-term market relationships enable production optimization, strengthen local value chains, and enhance farmers' financial stability. This not only drives economic growth but also reinforces social cohesion in local communities.

Society

Sustainable prison food supply models offer broad societal benefits. By prioritizing local sourcing, they reduce environmental impact and minimize carbon emissions from food transportation (Davies & Williams, 2019). Additionally, they promote regional economic development and help reduce social inequalities. Sustainable food systems contribute to social resilience, positioning food supply as both a necessity and a pillar of social justice and environmental responsibility.

Actors

Local producers

Local producers play a crucial role in correctional food systems by supplying sustainable raw materials (Harris, 2020). Their contributions strengthen the local economy, reduce the environmental footprint of food transport, and support community well-being. By providing high-quality, nutritious ingredients, they enhance food quality in correctional institutions while securing long-term market opportunities.

Food suppliers for correctional institutions

Food suppliers serve as the backbone of the institutional catering system, overseeing the efficient use of local ingredients, the development of nutritious meal plans, and the optimization of logistics. Their role is directly tied to sustainability goals, as their operations impact both social welfare and the environment (Harris, 2020).

Decision-makers

By defining sustainability guidelines in public procurement processes, decision-makers contribute at both the regulatory and strategic levels to the success of penal institution food systems (Evans, 2020). The frameworks they establish determine the core principles of food system operations, ensuring that sustainability and healthy nutrition are effectively integrated. These regulations guarantee that procurement prioritizes local and sustainable food sources, securing long-term economic and environmental benefits. By enforcing policies that encourage short supply chains and sustainable farming practices, policymakers play a key role in shaping the future of prison food systems. Their decisions impact the feasibility of integrating local farmers, reducing carbon emissions, and fostering economic stability in rural areas.

To ensure that food supply systems meet economic, social, and environmental expectations in the long term while supporting local economic actors, the transformation of the current, primarily price-focused food supply system in penal institutions is moving toward an integrated model that comprehensively considers sustainability, economic, and social factors (Foster, 2018).

Results

This new system prioritizes sustainable foods, such as local and seasonal products (Jackson, 2021). This approach not only reduces environmental impact but also improves food quality. It contributes to supporting local producers and the spread of sustainable agricultural practices.

By shortening supply chains, logistical costs decrease while minimizing the environmental burden resulting from transportation (Owens, 2021). This approach strengthens the local economy by facilitating more direct connections between producers and consumers.

The new system creates stable and predictable market conditions for smaller farmers, allowing them to engage in long-term planning and ensure economic sustainability (Reed, 2018). As a result, it reduces farmers' market uncertainties while promoting the economic development of rural communities and strengthening social cohesion.

This transformation does not only reform the operation of food supply systems in penal institutions but, in the long term, contributes to developing a more sustainable and just food model that places the balance of economic, social, and environmental aspects at its center.

The food supply systems of penal institutions significantly differ from traditional public catering models. According to the 2013 Penal System Act, the goal of correctional institutions is to achieve self-sufficiency, which fundamentally differs from the comprehensive regulation of public catering, which also includes the protection of short supply chains and the integration of local producers.

Article 76 of the 2015 Public Procurement Act recommends considering environmental aspects when evaluating bids. Nevertheless, in practice, pricing remains the primary factor, which undermines the enforcement of sustainability objectives and raises the question of who could act as the integrator. Under the current legal framework, penal institutions could theoretically take on the role of integrators, creating a model where they work with multiple suppliers, thereby implementing „in-house" procurement.

This would allow for the development of direct connections with local producers, optimizing demand forecasting and improving inventory management. Through this, the establishment of long-term contracts would increase market stability and promote economic growth.

The sustainability of public procurement systems is determined not only by regulatory frameworks but also by environmental factors, particularly climate change. Ingram (2020) highlights that enhancing the resilience of food systems is crucial for mitigating the effects of climate change. Improving the adaptability of food systems is essential to ensure that public procurement regulations incorporate sustainability considerations. Zurek (2020) emphasizes that enhancing the efficiency of food supply chains can help overcome sustainability barriers.

The development of sustainable food systems requires an integrated approach that considers the interactions between social, economic, and environmental factors. According to Ingram (2020), the transformation of such systems does not only affect production processes but also extends to the distribution and consumption phases. The transformation of food systems necessitates integrated modeling and planning approaches. Zurek (2020) suggests that scenario-based modeling can be an effective tool for achieving sustainability goals, particularly in managing uncertainties caused by climate change.

In establishing sustainable food systems, key elements include the use of local resources, the preference for seasonal foods, and efforts to minimize waste (Vetőné, 2012). These principles not only support the sustainability of global supply chains but are also particularly relevant for closed institutional systems, such as penal institution food supply.

Food supply systems in penal institutions require a systematic approach, as complex relationships exist between producers, public catering service providers, and correctional institutions as consumers.

Ensuring the resilience of the supply chain is essential for the sustainable operation of integrated food systems in penal institutions. According to Zurek (2020), model-based analysis of food systems can contribute to more efficient resource utilization and the achievement of long-term sustainability.

The BATWOVE analysis highlights that the integration of sustainable procurement strategies in penal institutions can significantly reduce food system costs while enhancing the financial stability of producers. Additionally, sustainable procurement can contribute to reducing the ecological footprint, as it minimizes the environmental impact of transportation.

Elgin (1993) introduced the „less but better" philosophy, emphasizing that sustainability is not only about reducing the quantity of production and consumption but also about prioritizing high-quality, well-designed, and regulated production and consumption models. This „less but better" approach also brings economic benefits, such as cost efficiency.

The rules of public procurement have a significant impact on sustainable purchasing strategies. Optimizing procurement processes can create opportunities to prioritize local producers while fostering more sustainable procurement practices.

The implementation of „in-house" procurement, where penal institutions act as their own integrators, could optimize the supply system, strengthen direct partnerships with local farmers, and create a more stable and efficient food supply model.

Conclusions

Decades of research in sustainability and public procurement have significantly influenced the evolution of food supply systems in penal institutions. As early as 2011, Kotler emphasized that aligning public procurement with broader legal frameworks could drive economic growth and expand consumer markets. In this context, penal institutions represent a stable and predictable consumer group, making them a key driver for integrating sustainable supply chains.

Unlike traditional public catering models, penal institution food systems require a new integration model to address modern economic and logistical challenges. The continuous and stable demand from correctional facilities allows agricultural producers to engage in long-term planning**,** cost-effective production**,** and strategic investments. This is particularly crucial for small-scale agricultural producers, who often struggle with market fluctuations and lack the resources to adapt quickly to changing demands (Bijman, 2012).

Long-term contracts provide income stability, reducing financial uncertainty and enabling more efficient resource utilization. This is especially important for SMEs, whose financial health depends on predictable demand and controlled production costs (Pretty, 2008). Penal institution food supply systems also create direct producer-to-consumer links, facilitating efficient demand forecasting and streamlined logistics. The integration of IT solutions, such as automated demand forecasting and inventory management, further optimizes production, minimizes waste, and reduces logistical costs (Ostrom, 1990).

Ensuring equal market access and improving SME integration is critical for long-term economic sustainability (López & García, 2017). Addressing regional disparities is also essential, as producers in underdeveloped areas often lack the necessary infrastructure and logistical networks to connect with larger supply chains. By enhancing regional infrastructure, expanding logistical networks, and strengthening local economies, rural producers can fully participate in institutional catering systems, contributing to regional economic stability and growth (Jones et al., 2018).

At the core of this model is a well-structured, integrated supply chain, sustained by the consistent demand of penal institutions. This predictability allows agricultural producers to optimize production, reduce risks, and achieve greater economic efficiency. Deeper integration within the food sector is essential for ensuring long-term stability and sustainability.

The new model promises significant improvements in cost efficiency**,** supply security, and environmental impact, while complying with legal and sustainability standards. Implementing technological innovations – such as IT- driven inventory management and demand forecasting – enhances resource efficiency, reduces waste, and aligns production with strict adherence to competition regulations institutional needs.

However, integration must not lead to economic concentration or monopolization. To prevent market distortions, is essential. State actors must ensure equal opportunities for smaller farmers, reducing the risk of economic dominance by large corporations. Additionally, targeted support is necessary for producers in less developed regions, enabling them to fully benefit from integration efforts.

For Hungary's agricultural economy to remain stable, a functional, sustainable, and cooperative supply system must be established. Producer collaboration within an integrated model enhances economic stability**,** improves supply security, and advances sustainability goals. By leveraging predictable demand and strategic partnerships, penal institution food systems can serve as a model for sustainable and equitable agricultural development.

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