

An investigation of casinos' sustainable development goals (SDGs) practices in Macau

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INTRODUCTION

The casino industry has been stigmatized by its association with various negative social impacts, ranging from threatening individual health, financial stress, family violence, theft, fraud, to money laundering (World Health Organization, 2024). Many communities reluctantly support casinos due to the promising economic impacts, such as increased tax revenues and employment opportunities, but pre-existing negative impressions often remain (Chen McCain, et al., 2019; Lee, et al., 2018). Due to the controversial nature of the industry, building a positive image is especially critical; hence, corporate social responsibility (CSR) is particularly important for casinos (Jansen, et al., 2024). As indicated by Perez and del Bosque (2012) "CSR is one of the most effective tools a company can use to improve its public image" (p. 146).

As defined by Brown and Dacin (1997) a company's CSR efforts "reflect the organization's status and activities with respect to its perceived societal obligations" (p. 68). Research evaluating casino industry CSR practices is extensive. However, the majority of the previous studies that assessed casino CSR followed Carroll's (1999) four dimensions of CSR (Seiko, et al., 2018; Chen McCain et al., 2019) or Environmental, Social, Governance (ESG) performance. Few studies evaluated casinos' CSR efforts using the United Nation's 17 SDGs. Since the implementation of the 17 SDGs has been a global agenda in 2015, an evaluation of the casino industry's practice of these goals is necessary.

The Stockholm Resilience Centre's "wedding cake" model categorized the 17 SDGs into three layers: Economy, Society, and Biosphere. (Stockholm Resilience Centre, 2016) The wedding cake model proclaims that the SDGs should not be practiced in isolation but must interact and build upon one another (Stockholm Resilience Centre, 2016). The three layers echo the triple bottom line: Economy (SDGs 8, 9, 10, 12), Society (SDGs 1, 2, 3, 4, 5, 7, 11, 16), and Biosphere (SDGs 6, 13, 14, 15). These three layers integrate through the 17th SDG: partnership for the goals.

Among these layers, the economic layer serves as the foundation for for-profit businesses. As Carroll (1979) asserted, "before anything else, the business institution is the basic economic unit in our society. All other business roles are predicated on this fundamental assumption" (p. 500). This is particularly relevant in casino-driven economies like Macau, where casinos are expected to provide tax revenue and jobs (Bybee & Aguero, 1998; Chen McCain et al., 2019). Macau's casinos paid the government \$11 billion in gaming taxes in 2024 (Verma, 2025). Furthermore, in 2023, 51,771 employees worked in Macau's gaming industry (Statista, 2026), and as of May 2025, 10,407 residents worked at casinos in mid-to-senior level positions (Gambling Insider, 2025). Thus, the purpose of this study is to investigate casinos' practices regarding the economic SDGs (8, 9, 10, and 12). The results of this study will assist casino operators and policymakers in understanding the current progress of SDGs among casinos and provide recommendations for achieving the 2030 agenda.

METHOD

Data for the study were drawn from the annual reports of six publicly traded casinos in Macau: SJM Holdings, Wynn Macau, Galaxy Entertainment Group, Venetian Macau, MGM China Holdings, and Melco Resorts & Entertainment.

Given the high licensing costs of commercial software and the time-intensive nature of traditional manual coding, Large Language Models (LLMs) have emerged as reliable, cost-effective aids for qualitative content analysis (Bijker et al., 2024). However, standard LLMs can suffer from "hallucinations," generating plausible but incorrect information not found in the source text. To mitigate this, this study utilized NotebookLM, which employs Retrieval Augmented Generation (RAG)

technology. Unlike general models that rely on internal pre-training, RAG anchors the model's responses strictly to specific uploaded documents, in this case, the casino annual reports. This grounding mechanism significantly reduces the risk of fabrication by requiring the AI to retrieve and cite evidence directly from the source material before generating a response (Daraio et al., 2026). The model was first primed to define the four economic SDGs and their associated targets. Subsequently, it analyzed the reports to identify all impacted stakeholders and expenditures specifically related to SDGs 8, 9, 10, and 12. Finally, the outputs were cross checked by the authors who are familiar with the context.

FINDINGS

SDG 8: Promote inclusive and sustainable economic growth, employment and decent work for all.

Among the 12 SDG associated targets, the six casinos practiced three: Supporting SME (Target 8.3), Full Employment (Target 8.5), and Sustainable Tourism (Target 8.9).

Table 1. SDG 8 Initiatives and Spending

Target	Initiatives	Spendings (HKD)
8.3 Supporting SMEs	• Macau-based suppliers. • Large Business Leading Small Business" model. • Locally owned Small and Medium Enterprises.	\$172,839,406
8.5 Full Employment	• Total employees working at the six casinos- 115,159	\$40 billion (staff costs)
8.9 Sustainable Tourism	• Macau community and international tourists. • New Cultural Exhibitions. • Cultural Tourism landmarks. • Non-gaming capital projects and event programming.	\$46.428 billion

SDG 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation.

Among the 8 associated targets, the casinos practiced one: Sustainable Industry (Target 9.4).

Table 2. SDG 9 Initiatives and Spending

Target	Initiatives	Spendings (HKD)
9.4 Sustainable Industry	• Macau Government through contributions to public development, social security, cultural interests, and infrastructure.	\$10.24 billion (5% of Gross Gaming Revenue)

SDG 10: Reduce inequality within and among countries.

Among the 10 SDG associated targets, The casinos practiced two targets: Social Inclusion (Target 10.2) and Equal Opportunity (Target 10.3).

Table 3. SDG 10 Initiatives and Spending

Target	Initiatives	Spendings (HKD)
10.2 Social Inclusion	• Local Macau community, charitable organizations (e.g., GEG Foundation, Youth Achievement Program). • Underprivileged, children's elderly groups. • EmpowHER" support group for women; funded construction of Aoyi Primary School in Jiangxi.	\$118,100,000
10.3 Equal Opportunity	• Female representation on the board (1 out of 8 directors). • Women-to-men ratio in workplace ranging from 49%-51% to 52%-48%.	N/A



SDG 12: Ensure sustainable consumption and production patterns.

Among the 11 SDG associated targets, The casinos practiced one target: Sustainable management and efficient use of natural resources (Target 12.2).

Table 4. SDG 10 Initiatives and Spending

Target	Initiatives	Spendings (HKD)
12.2 Sustainable management and efficient use of natural resources	• The environment through green transformation, including New Energy Vehicle (NEV) shuttle buses and solar panels. • BREEAM 'Excellent' certified projects and elimination. • The local and global environment (managed through Sustainable Procurement and Vendor Code of Conduct). • 100% rPET water bottles and sustainable seafood sourcing. • LED lighting, paper reduction, and natural gas/electric shuttle buses.	Costs integrated into capital expenditures.

CONCLUSION

The results revealed that among the four economic SDGs, the six casinos demonstrated the most robust initiatives in SDG 8 (Decent Work and Economic Growth). This confirms the nature of a gaming-driven economy, providing over 115,000 job opportunities with HK\$40 billion in staff costs. Additionally, the casinos spent over HK \$172 million to support local suppliers and local Small and Medium Enterprises. Furthermore, the six casinos contributed HK \$46.428 billion to promote sustainable tourism.

The operators demonstrated efforts in promoting sustainable industrialization (SDG 9) by contributing 5% of their gross gaming revenue (HK\$10.24 billion) to public development and infrastructure. However, the Annual Reports lacked clear initiatives fostering innovation. Regarding SDG 10 (Reducing Inequality), the casinos practiced this on a smaller scale, focusing on youth, underprivileged groups, and gender equality within their workforce. Similarly, SDG 12 (Responsible Consumption) was addressed by integrating sustainable management into broader capital expenditures. These findings suggest that while economic contributions are substantial, there are opportunities for casinos to enhance their reporting and practices regarding innovation and specific social inequalities to achieve a more balanced sustainable development.

LIMITATIONS AND RECOMMENDATIONS

AI is programmed with predetermined SDGs targets but lacks contextual judgement. For instance, multiple initiatives were categorized under two or three different targets by keywords matching instead of deeper understanding. Or, if a casino's annual report does not explicitly use the exact SDGs wording embedded in the system, related initiatives may not be captured. Hence, Human-in-the-Loop (HIL) phase is recommended to allow subject matter experts to review these classifications and determine the most relevant or strategic target to overcome the limitations of LLMs in capturing these subtleties.

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