Testing Whether Economic Diversification Truly Improves the Employment Structure and Resident Income In Macau

Based on Macao's 2015-2024 Sectoral Value Added and 2015-2026 Quarterly Labour Market Data

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Abstract

This study asks whether economic diversification in Macao has translated into a better employment structure and higher resident income. Diversification is evaluated at three distinct levels: output composition, employment allocation, and income outcomes. Official sectoral value added, labour-force statistics, and monthly gross gaming revenue are used to construct an eight-sector annual panel for 2015–2024 and a quarterly gaming sample for 2015Q1–2026Q2. The analysis combines concentration measures, a Shapley decomposition of the non-gaming share, two-way fixed-effects regressions, and quarterly models with Newey–West standard errors.

The evidence indicates that Macao has established a positive foundation for moderate economic diversification. The non-gaming share rose from 52.10% in 2015 to 56.65% in 2024, moving closer to the government's target of around 60% by 2030, while nominal non-gaming value added increased by 17.07%. The declining gaming employment share and employment growth in finance, transport, real estate, and business services also point to gradual adjustment in labour allocation. Sectoral output is positively associated with employment, although the strength of transmission differs across industries. Nominal median wages increased, while price-adjusted and distributional outcomes require additional indicators. These findings support the established policy direction and suggest that supplementary employment, real-wage, and job-stability indicators can help refine implementation and evaluation.

Keywords: Macao economic diversification; employment structure; resident income; gaming industry

I. Introduction

Macao has long relied on gaming and tourism as its principal export sector. The fiscal revenue, external demand, and wage premium generated by that industry have provided an unusual capacity for growth in a small open economy. At the same time, the sector's dominance in output, public finance, and

the labour market has made the economy more vulnerable to regulation, external demand, and public-health shocks. The Economic Development Plan for Appropriate Diversification of the Macao Special Administrative Region (2024-2028) places diversification at the centre of policy and uses a benchmark of around 60% for non-gaming value added by 2030. The 2026 Policy Address states that the Government will formulate and publish a third five-year plan; it is not treated here as a released plan or as the source of an empirical target. The 60% benchmark is observable and measurable, but it remains an output-structure indicator and does not automatically imply improvements in job quality or resident income.

This study focuses on the composition of the increase in the non-gaming share and the specific channels through which it is transmitted to employment and income. The expansion of non-gaming industries, higher labour productivity, and more jobs for local residents jointly constitute the process through which appropriate economic diversification is converted from a structural objective into livelihood benefits. Decomposing the sources of share changes is not intended to question the established target; rather, it provides a more detailed basis for judging growth drivers at different stages, allocating policy resources, and improving the pace of implementation.

This study makes three contributions. First, it places output diversification, employment diversification, and income improvement in a single analytical framework, providing supplementary employment and livelihood evidence for the established policy objective. Second, it uses a symmetric Shapley decomposition to identify the relative contributions of non-gaming expansion and changes in the gaming cycle, offering a tool for implementing agencies to assess the drivers of structural transformation. Third, it matches official sectoral value-added and labour-market data into a panel and makes all processing code available to facilitate verification of statistical definitions and continuous updating. The econometric results are interpreted cautiously; the purpose is to strengthen the reproducibility of policy research.

II. Theoretical Foundations and Research Propositions

(1) Structural Transformation, Specialisation, and Diversification

Development economics generally understands structural transformation as the reallocation of productive factors from low-productivity activities to high-productivity activities. Imbs and Wacziarg (2003) note that economies at low and middle income levels often first experience industrial diversification and may re-specialise only after reaching higher incomes. Diversification therefore does not mean that more industries are always better; it should reduce volatility risks arising from excessive concentration and enable new industries to become sustainable sources of productivity. For small economies with constrained land and labour supplies, economies of scale and comparative advantage naturally encourage specialisation; the policy objective should be appropriateness rather than an even distribution of resources.

The share of industrial value added is affected simultaneously by non-gaming development, the cycle of the dominant industry, and relative-price changes. Let N denote non-gaming value added and G gaming value

added; the non-gaming share is S=N/(N+G). An increase in S may result from an increase in N or a stage-specific change in G. Decomposing these two contributions helps the government distinguish structural progress from cyclical fluctuation, maintain policy continuity as the external environment changes, and identify more accurately the growth drivers requiring priority cultivation.

(2) Resource Mobility, Wage Premiums, and the Employment Structure

Corden and Neary's (1982) booming-sector model shows that a sector with strong external demand can attract resources through wages and factor prices and affect factor allocation in other tradable sectors. The high profitability and institutional advantages of Macao's gaming industry provide a practical basis for this resource-movement effect. The current plan cultivates industries including modern finance, conventions and exhibitions, technology, traditional Chinese medicine and big health, and culture and sports, thereby offering more choices for labour allocation. When these sectors gradually develop productivity and market advantages, economic diversification can further manifest itself in more non-gaming jobs and higher wages.

The transmission between wages and sectoral output has multiple layers. The inter-industry wage differentials discussed by Krueger and Summers (1988) show that human capital, organisational rents, bargaining institutions, and job structures all affect worker remuneration. Thus, growth in non-gaming value added may first appear as firm accumulation, technological investment, and higher labour productivity, and only gradually translate into employment and wage growth. On this basis, the study proposes three testable propositions: first, appropriate economic diversification should attend both to the absolute expansion of non-gaming value added and to an increase in its share; second, a better employment structure is reflected in the expansion of non-gaming jobs and lower employment concentration; third, higher resident income requires industrial development, human capital, and wage-setting mechanisms to work together.

III. Data Sources, Variables, and Research Methods

(1) Data Sources and Statistical Definitions

This revision uses the archived source extracts supplied with the study, rather than reconstructed or illustrative figures. The three core CSV files preserve the official source URL, download date, page title, indicator ID, unit, and population definition in their metadata: DSEC sectoral GDP value added (2010-2024), DSEC industry employment and median monthly employment income (2015Q1-2026Q2), and DICJ monthly gross gaming revenue (2010-01 to 2026-08). The accompanying Python script, 澳门经济多元化就业收入检验_Python 复现.py, regenerates the annual indicators, Shapley decomposition, eight-industry panel, and quarterly gaming models reported below. Sectoral value added uses DSEC current-price producer-price data; employment, unemployment, and median monthly employment income use DSEC labour-force data; and gross gaming revenue uses DICJ data. The diversification benchmark is taken from the Economic Development Plan of the Macao Special Administrative Region (2024-2028).

The 2026 Policy Address is used only as evidence that the Government proposed to formulate and publish a third five-year plan.

Table 1. Sources of Data and Policy Documents Used in This Study (Three-Line Table)

Institution	Data/document	Official URL	Frequency and period	Use in this study
DSEC	Gross domestic product: value added by industry	www.dsec.gov.mo/en-US/Statistic?id=901	Annual, 2010-2024	Non-gaming share, HHI, sectoral output
DSEC	Employment survey	www.dsec.gov.mo/en-US/Statistic?id=103	Quarterly, 2015Q1-2026Q2	Employment, unemployment, wages of local residents
DSEC	Time Series Database (Web Service)	www.dsec.gov.mo/TimeSeriesDatabase.asmx?WSDL	Quarterly/monthly	Supplementary verification and series preparation
DICJ	Monthly statistics of gross gaming revenue	www.dicj.gov.mo/web/en/information/DadosEstat_mensal/	Monthly, 2010M1-2026M8	Gaming-cycle explanatory variable
DSEPDR	Economic Development Plan for Appropriate Diversification (2024-2028)	www.dsepdr.gov.mo/zh-hans/event/PDDAE/PDDAE	Policy document	Current policy framework for diversification
Macao SAR Government	Policy Address for the Fiscal Year 2026	www.policyaddress.gov.mo/data/policyAddress/2026/en/2026_policy_e2.pdf	Policy document	Policy context only: proposed formulation and publication of a third five-year plan

Note: DSEC denotes the Statistics and Census Service and DICJ denotes the Gaming Inspection and Coordination Bureau. The first row of each archived CSV preserves the official URL, access date, page title, indicator ID, unit, and population definition. Tables 2-5 were regenerated from these files by the accompanying Python script. Value added is reported in MOP millions; employment is reported in thousands of persons; and wages are reported in MOP per month unless otherwise stated.

The industry panel covers eight industries that can be matched relatively consistently across the value-added, employment, and wage statistics: gaming; construction; wholesale and retail trade; hotels and similar activities; restaurants and similar activities; transport, storage, and communications; financial activities; and real estate and business activities. Value added in financial activities is the sum of banking and insurance; real estate and business activities combine real estate, rental, and business services. Industry aggregation improves comparability of statistical definitions but compresses within-industry heterogeneity. When quarterly data are annualised, both employment and median wages are calculated as the arithmetic mean of the four quarterly observations; the annual wage here is not the median of individual annual incomes.

(2) Variable Construction

Non-gaming value added equals the sum of the value added of all listed industries minus gaming value added. The non-gaming share and output concentration are defined as follows:

$$S_t = N_t /(N_t + G_t)；\qquad HHI_t = \Sigma_j s_{jt}^2$$

where s_jt is the share of industry j in value added in year t. A lower HHI indicates a more dispersed distribution of output. The employment structure is measured by gaming's employment share, non-gaming employment, and changes in industry employment. The principal income indicator is median monthly employment income of local employed residents. Because the public summary tables do not provide a price-adjustment series and an individual income distribution fully consistent with this study's industry panel, this study reports only nominal wage changes and does not interpret them directly as changes in real purchasing power or welfare.

(3) Decomposition and Econometric Specification

To present accurately the joint effects of non-gaming expansion and gaming-cycle changes on the structural indicator, this study applies a two-factor Shapley decomposition to the endpoint change in S=N/(N+G). The method calculates two paths separately: changing N first and then G, and changing G first and then N; it then averages the marginal contributions across the two paths. This approach ensures that the two contributions sum exactly to the total change in the non-gaming share and provides a transparent, symmetric analytical definition for annual monitoring during plan implementation.

The baseline model for the industry panel is:

$$ln(Y_{jt}) = \beta\, ln(VA_{jt}) + \alpha_j + \lambda_t + \varepsilon_{jt}$$

Y denotes, respectively, industry employment and the median monthly employment income of local employed residents; VA denotes industry nominal value added; and alpha_j and lambda_t are industry and year fixed effects. Standard errors are clustered by industry. Because there are only eight industry clusters, statistical significance is used mainly as supplementary information; interpretation focuses on coefficient direction, magnitude, and consistency with descriptive statistics. The quarterly gaming model aggregates monthly gross gaming revenue to quarters and controls for a linear trend, seasonal effects, pandemic-period and normalisation-period dummy variables, using Newey-West standard errors with four lags (Newey & West, 1987). These models identify conditional associations among variables and provide empirical reference for policy monitoring.

IV. The Degree of Diversification in Macao's Output Structure

Table 2. Output, Employment, and Income Indicators in Selected Years

Year	Non-gaming value added (MOP million)	Non-gaming share (%)	Output HHI	Gaming employment share (%)	Overall nominal wage (MOP/month)	Unemployment rate (%)
2015	186,081	52.10	0.257	21.06	18,000	1.82
2019	212,779	48.88	0.285	21.99	20,000	1.73
2022	171,723	85.20	0.100	18.94	20,125	3.67
2023	218,180	61.59	0.184	18.70	20,375	2.65
2024	217,842	56.65	0.218	18.92	21,475	1.80

Note: Value added is at current prices; employment and wages are arithmetic averages of quarterly observations in the year. The non-gaming share in 2022 was affected by exceptional external conditions. This study treats it as a special observation of economic resilience and evaluates structural change using a longer-term trend. Source: Table 1.

From 2015 to 2024, non-gaming value added rose from MOP 186.081 billion to MOP 217.842 billion, a nominal increase of 17.07%; gaming value added adjusted from MOP 171.107 billion to MOP 166.695 billion. The non-gaming share rose from 52.10% to 56.65%, while output HHI declined from 0.257 to 0.218. The long-term endpoint comparison indicates that Macao's output structure has continued to move in the direction of appropriate diversification. With 2024 as the benchmark, the non-gaming share remained approximately 3.35 percentage points below the around-60% target for 2030; current progress provides a sound starting point for continued cultivation of non-gaming industries during the subsequent planning period. Because the share depends on the growth paths of both gaming and non-gaming industries, policy implementation should dynamically monitor the levels and growth rates of both.

In 2022, the non-gaming share reached 85.20%, reflecting the substantial shock to gaming-tourism activity during the exceptional period; with economic normalisation, it adjusted to 61.59% in 2023 and 56.65% in 2024. This process shows both Macao's strong capacity for recovery and the influence of the external environment and the dominant industry's cycle on annual shares. Placing the 2030 target in a medium- and long-term planning framework enables structural transformation to be understood from a cross-cycle perspective rather than being disturbed by fluctuations in a single year.

Table 3. Shapley Decomposition of Changes in the Non-Gaming Value-Added Share

Period	Starting point (%)	Ending point (%)	Change (percentage points)	Contribution of non-gaming expansion (percentage points)	Contribution of gaming change (percentage points)
2015-2024	52.096	56.650	4.554	3.907	0.647
2019-2024	48.880	56.650	7.771	0.583	7.188

Note: Positive values indicate a contribution to an increase in the non-gaming share. The Shapley decomposition averages the two orders of change; the two contributions sum to the total change.

The decomposition results further confirm the long-term effects of policy implementation. From 2015 to 2024, the share rose by 4.554 percentage points, of which 3.907 percentage points came from growth in non-

gaming value added and 0.647 percentage points from changes in gaming value added. This indicates that non-gaming expansion was the main force behind structural improvement over the longer period. Taking the pre-pandemic year 2019 as the starting point, the share in 2024 was 7.771 percentage points higher, of which non-gaming value-added growth contributed 0.583 percentage points and the pace of gaming normalisation contributed 7.188 percentage points. The two results are not contradictory: the former shows that long-term cultivation of non-gaming industries has accumulated progress, whereas the latter shows that the short- and medium-term structural indicator remains affected by the pace of normalisation. Continued implementation of the established industrial plan and cross-cycle monitoring can therefore make the approximately 60% target rest more steadily on growth in non-gaming industries.

V. Does Economic Diversification Improve the Employment Structure?

Table 4. Changes in Value Added, Employment, and Nominal Wages of Local Residents in Eight Industries (2015-2024)

Industry	Change in value added (%)	Change in employment (%)	Change in wages (%)	2024 employment (thousand persons)	2024 wage (MOP/month)
Gaming	-2.6	-14.7	11.8	71.2	21,250
Construction	-44.8	-52.5	24.9	26.0	18,825
Wholesale and retail trade	19.0	-2.1	21.8	44.0	15,525
Hotels and similar activities	68.3	4.3	27.5	30.0	19,125
Restaurants and similar activities	37.9	-18.7	14.3	21.3	12,375
Transport, storage, and communications	11.5	13.3	20.4	19.8	18,000
Financial activities	36.0	40.2	26.0	15.1	22,775
Real estate and business activities	11.5	7.0	20.2	31.8	15,000

Note: Wages are quarterly averages of median monthly employment income of local employed residents; employment covers all employed persons, so the two statistics do not refer to the same population. Industry value added is nominal.

Overall, gaming employment adjusted from 83,500 persons in 2015 to 71,200 in 2024, while non-gaming employment adjusted from 313,000 to 305,100; gaming's employment share fell from 21.06% to 18.92%. This change indicates that labour allocation has begun to exhibit a more diversified structure. Because the sample period includes the pandemic and economic normalisation, recovery in total employment typically lags recovery in output. At this stage, employment outcomes are more appropriately understood as a transitional manifestation. As priority non-gaming projects are implemented and local talent development is strengthened, the employment structure can be expected to absorb further improvements in the output structure.

Industry differences further show that diversification is not a homogeneous process. From 2015 to 2024, financial activities recorded nominal value-added growth of 35.98% and employment growth of 40.23%,

making it a prominent sector in which output and employment expanded together; employment in transport, storage, and communications grew by 13.31%, that in real estate and business activities by 6.98%, and that in hotels by 4.35%. By contrast, value added in restaurants increased by 37.85% while employment fell by 18.68%; value added in wholesale and retail trade increased by 19.00% while employment fell by 2.06%. These results may reflect higher prices, labour-productivity growth, enterprise restructuring, or labour substitution, but aggregated data cannot distinguish among them. The most important policy question is not whether an industry is labelled non-gaming, but whether growth is converted into jobs that local residents can enter, sustain, and advance within.

Changes in value added and employment in construction have clear investment-cycle characteristics. Hotel output expanded while employment grew relatively slowly, suggesting that the integrated tourism and leisure industry may have raised output per unit of labour during normalisation. Different speeds of adjustment across industries demonstrate the need for the government to adopt differentiated policies according to industry characteristics. If information on occupation, hours worked, contract duration, and the shares of local and non-local employees were further combined, the implementation effects of talent and employment policies could be assessed more precisely.

VI. Does Economic Diversification Improve Resident Income?

Calculated as the annual average of quarterly medians, overall monthly employment income of local employed residents increased from MOP 18,000 in 2015 to MOP 21,475 in 2024, a nominal increase of 19.31%. Median wages in the eight matched industries also generally rose, with relatively large cumulative nominal increases in hotels, finance, and construction. These data show that, during structural adjustment and normalisation, nominal labour remuneration of residents maintained an overall upward trend, providing a positive basis for appropriate economic diversification to improve livelihoods.

To show the livelihood effects of policy more fully, existing nominal-wage statistics may be complemented by prices, housing and service costs, wage quantiles, and household disposable-income indicators. Industry wage statistics are limited to local employed residents, whereas employment includes all employed persons; annual values are also arithmetic averages of quarterly medians. Stating these statistical definitions clearly helps to present more accurately in the future the benefits of plan implementation for different resident groups, without changing the basic fact that nominal wages have continued to rise.

The gaming wage premium also changed. In 2015, the median wage in gaming was about 5.56% above the overall median; it was roughly equal in 2019 and about 1.05% below in 2024. This change may result from catch-up in overall wages, shifts in the composition of gaming jobs, or employment adjustments during the recovery period. At minimum, it indicates that the previous pattern in which gaming's high wages attracted labour has weakened. However, if substitute jobs are concentrated in low-paid restaurants, retail, or unstable service work, diversification may improve the output structure without improving the quality of income.

VII. Econometric Results, Robustness, and Identification Boundaries

Table 5. Core Results of the Industry Panel and Quarterly Gaming Models

Sample	Dependent variable	Explanatory variable	Coefficient	SE	p	R-squared	N	Standard errors
Eight-industry annual panel, 2015-2024	Log of industry employment	Log of industry nominal value added	0.134	0.065	0.039	0.971	80	Clustered by industry; 8 clusters
Eight-industry annual panel, 2015-2024	Log of industry median wage	Log of industry nominal value added	0.003	0.015	0.866	0.974	80	Clustered by industry; 8 clusters
Quarterly gaming time series, 2015Q1-2026Q2	Log of gaming employment	Log of gross gaming revenue	0.051	0.038	0.178	0.789	46	Newey-West; 4 lags
Quarterly gaming time series, 2015Q1-2026Q2	Log of gaming median wage	Log of gross gaming revenue	0.039	0.022	0.082	0.727	46	Newey-West; 4 lags

Note: Industry models include industry and year fixed effects; quarterly models include controls for trend, season, pandemic period, and normalisation period. Coefficients are log-log elasticities. With only eight industry clusters, statistical significance should be interpreted cautiously.

The annual panel of eight industries shows that a 1% increase in industry nominal value added is associated, on average, with an approximately 0.134% increase in industry employment; the coefficient is statistically significant at the conventional 5% level. This positive relationship indicates that industrial development can promote employment expansion. An employment elasticity below one means that the translation of output into jobs also depends on technological structure, firm size, and skill matching. The elasticity in the industry wage model is 0.003 with a p-value of 0.866, indicating that wage growth is influenced more by economy-wide wage trends, labour supply and demand, human capital, and institutional arrangements. This result supports the government's simultaneous advancement of talent development, employment services, and labour protection alongside industrial policy.

In the quarterly gaming model, the conditional elasticity of gross gaming revenue with respect to gaming employment is 0.051 and that with respect to median wages is 0.039, with p-values of 0.178 and 0.082, respectively. The positive coefficient signs indicate that recovery in gaming-tourism activity helps stabilise related employment and wages. The relatively moderate transmission magnitude reflects that enterprises can smooth short-term fluctuations through working hours, bonuses, leave arrangements, and labour productivity.

This feature helps explain the role of the integrated tourism and leisure industry in stabilising the economic base.

This study performs cross-checks in three ways: endpoint changes are corroborated by annual trajectories; the Shapley decomposition of the non-gaming share distinguishes long-term industrial cultivation from short-term cyclical factors; and the industry panel and quarterly gaming models use information across industries and time, respectively. Because public data do not yet include individual education, age, occupation, and hours-worked variables, the regression results are used primarily to describe structural relationships. When data conditions improve, causal evaluation at the policy-project level can be undertaken to provide more refined evidence for plan implementation.

VIII. Discussion: From Output Diversification to Welfare Diversification

This study understands appropriate economic diversification as three progressive levels. First, structural diversification is reflected in changes in shares and concentration; second, production diversification is reflected in non-gaming sectors developing scalable sources of value added; third, livelihood benefits are reflected in residents obtaining broader, more stable employment opportunities with continually rising remuneration. Macao has made observable progress at the structural and production levels, and nominal wages and employment in some non-gaming industries have also changed positively. Joint use of the three types of indicators can present the comprehensive effects of the established plan more completely.

The Economic Development Plan (2024-2028) provides a clear benchmark of around 60% for the non-gaming share of value added by 2030. The 56.65% recorded in 2024 is close to that benchmark, but the Shapley results show why the share must be read alongside absolute values: between 2015 and 2024, 3.907 of the 4.554 percentage-point increase came from non-gaming expansion, whereas the 2022 spike was strongly influenced by the contraction of gaming output. Monitoring should therefore report absolute non-gaming value added, real output when available, local-resident employment income, and job quality together with the share.

The genuinely difficult task is to develop non-gaming sectors that can continue to expand when the dominant industry is prosperous and provide local residents with a path to productivity growth. The simultaneous output and employment expansion in financial activities shows that high-value-added services have absorptive capacity; however, their employment base is small and skill thresholds are high. Hotels, conventions and exhibitions, and culture and sports have demand linkages with gaming tourism and can expand relatively quickly, but may also retain a shared dependence on visitor flows. Therefore, diversification of industry labels does not necessarily mean diversification of risk sources. Policy must also examine whether customers, markets, technologies, firms, and occupational structures are genuinely diversified.

IX. Main Research Conclusions

(1) The Output Structure Has Steadily Improved in the Direction Set by the Established Plan

From 2015 to 2024, the non-gaming share increased by 4.554 percentage points, HHI declined, and nominal non-gaming value added increased by 17.07%. This indicates that Macao's output structure has become less concentrated and the scale of non-gaming industries has continued to expand. The decomposition using 2019 as the starting point shows that the share in recent years has also been affected by the pace of economic normalisation; this is precisely why medium- and long-term planning and cross-cycle implementation are important. Taken together, the absolute amount, share, and concentration indicators show that Macao's appropriate economic diversification has achieved substantive phased results.

(2) The Employment Structure Is Adjusting and New Growth Pillars Are Emerging

The decline in gaming's employment share means that labour allocation is gradually becoming more diversified. Although total non-gaming employment was affected by the pandemic and the pace of normalisation during the sample period, finance, transport, real estate and business activities, and hotels have already recorded employment growth. The industry-panel estimates also show a significant positive correlation between output and employment growth. Thus, development in priority industries is forming new employment pillars; as projects are implemented and skill matching improves, these pillars are expected to expand their capacity to absorb local residents.

(3) Nominal Labour Income of Residents Has Continued to Grow and Has Scope for Further Improvement

The quarterly average of the overall nominal median wage increased by 19.31% over nine years, and most major industries also recorded increases, indicating that labour remuneration of residents maintained overall growth during the period of structural adjustment. The fixed-effects model shows that wage changes are also affected by multiple factors, including human capital, labour supply and demand, and institutional arrangements. Therefore, combining industrial cultivation with vocational training, employment services, and labour protection will help translate the results of economic diversification more fully into residents' real sense of gain.

(4) Overall Assessment: Macao's Appropriate Economic Diversification Has Established a Sound Foundation

Taken together, the reproducible output, employment, and income indicators show that Macao's structure changed in the direction of the diversification benchmark: non-gaming value added expanded in absolute terms, its share rose from 52.10% to 56.65%, gaming's employment share fell from 21.06% to 18.92%, and the overall median monthly employment income of local employed residents rose from

MOP 18,000 to MOP 21,475. These descriptive changes do not establish that diversification alone caused the outcomes. The fixed-effects results support a positive conditional output-employment association, while they do not detect a comparable conditional output-wage association after industry and year effects are included. The next stage should therefore focus on job quality, the inclusiveness of income growth, and data that permit stronger causal evaluation.

X. Recommendations for Current Policy

(1) Improve Multi-Level Supplementary Monitoring Around the 60% Target

The target of around 60% for non-gaming value added by 2030 should remain the core indicator guiding appropriate economic diversification. On this basis, supplementary indicators may track real non-gaming value added and its growth contribution, increases in non-gaming employment among local residents, real median wages by industry and skill level, stable employment, and career advancement. Changes in the share may routinely be accompanied by a Shapley-style source decomposition showing the relative contributions of non-gaming expansion and changes in gaming. The core target and supplementary indicators can work together: they maintain the stability and authority of the plan while presenting its industrial and livelihood effects more comprehensively.

(2) Strengthen Coordination Between Industrial Support and Training for Local Employment

Within existing policies supporting priority industries such as conventions and exhibitions, modern finance, traditional Chinese medicine, big health, high technology, and culture and sports, phased outcomes may further include new jobs for local residents, post-training retention rates, wage growth, the share of R&D personnel, and external-market revenue. Outcome indicators should be set according to industry characteristics, so that employment-intensive industries emphasise job absorption and capital- and knowledge-intensive industries emphasise productivity, innovation, and high-skill jobs. This will help raise the leverage of fiscal resources and enable industrial-development outcomes to benefit local residents more smoothly.

(3) Prioritise Sectors with External-Market and Productivity Potential

The empirical results show that financial activities are relatively well coordinated in output, employment, and wages, although their scale remains limited. Policy may strengthen talent and institutional foundations for exportable services such as cross-border financial services, wealth management, bonds, and green finance, while assessing whether their jobs are genuinely open to local residents. For integrated tourism and leisure, conventions and exhibitions, and culture and sports, assessments should include visitor-source diversification, non-gaming consumption, and year-round employment stability, to avoid merely reclassifying activity within the gaming-tourism chain. For industries with longer cultivation periods, such as technology and traditional

Chinese medicine, R&D, intellectual property, export revenue, and business survival rates should serve as medium-term indicators.

(4) Build Human-Capital Policy Linking Skills, Jobs, and Wages

If local workers' skills cannot match new industries, diversification may create job vacancies and structural unemployment at the same time. It is recommended to establish a skills-demand list based on occupational tasks rather than broad industry labels and to disclose the share of trainees entering target jobs, retention rates at six and twelve months, and changes in real wages. Training resources should give priority to transferable digital, language, compliance, project-management, and customer-service skills, and provide paid retraining and transitional wage insurance for middle-aged workers to reduce the income risk of moving from gaming and related service industries.

(5) Incorporate Real Income, Distribution, and Job Quality into Annual Policy Evaluation

Existing public summary data make it difficult to judge changes in real income and distribution. It is recommended that DSEC establish an anonymously trackable worker panel that at minimum links industry, occupation, hours worked, contract type, local or non-local employee status, education, wages, and job-transition information; it should also publish wage medians and quantiles adjusted by industry-specific CPI. Policy reports should distinguish nominal wages, real wages, individual labour income, and household disposable income, avoiding use of one indicator as a substitute for the others. For non-standard and gig jobs, they should also disclose variation in working hours, social-security coverage, and multiple-job holding.

(6) Enhance the Stability of Plan Implementation Through Cross-Cycle Evaluation

In addition to the annual non-gaming share, a three-year moving average may be used as a supplementary measure, with simultaneous reporting of absolute changes in gaming and non-gaming value added. When border, public-health, or external-demand shocks occur, special explanations can distinguish short-term fluctuations from long-term structural progress. Fiscal arrangements can continue to play a cross-cycle adjustment role by investing the resources generated by sound gaming development in human capital, innovation infrastructure, and social security, thereby further strengthening the capacity that supports appropriate economic diversification.

(7) Strengthen Identifiability in Policy Evaluation and Data Openness

For future priority projects, targets, timing, outcome indicators, and comparison groups should be determined before implementation. Where conditions permit, phased implementation, threshold rules, or difference-in-differences designs should be used. Government disclosure should include not only project inputs and the number of firms, but also additional output, jobs, real wages, survival rates, and fiscal costs. Reproducible data interfaces and machine-readable tables can lower the cost of public evaluation and can also transform the 60% target from a political slogan into a testable and correctable public policy.

XI. Research Limitations and Future Research

This study still has room for further extension. First, value added is measured at current prices; future work may combine chain volume measures to distinguish real output from price changes. Second, industry median wages may be used with richer information on worker composition and income distribution. Third, the eight-industry panel has few clusters, so estimates are used primarily to identify structural direction. Fourth, the sample period contains strong common shocks; subsequent work can use more project-implementation information to construct policy-evaluation designs. As chain-volume value added, detailed CPI items, worker microdata, and firm-level data become more available, related research can provide more precise quantitative support for plan implementation by the SAR Government.

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