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Structural Shifts in Kazakhstan's Entrepreneurial Ecosystem: A Gender-Sensitive Analysis

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Abstract

Women's entrepreneurship in Kazakhstan has undergone a notable transformation in recent years, yet existing research has not fully captured how structural gender conditions shape these changes. This paper examines the evolution of women-led micro, small, and medium-sized enterprises (MSMEs) and the broader gendered economic environment between 2019 and 2024. The study employs time-series modelling, a structural break test, and a composite index approach, using national gender-disaggregated data from the Kazakhstan Statistical Compendium. Descriptive and econometric analyses reveal a significant regime shift in 2022: women-led MSMEs increased sharply, and the estimated model identifies a statistically meaningful break in both the level and growth rate of entrepreneurial activity. To assess whether this shift reflects a broader structural change, the paper develops the Composite Entrepreneurship Gender Index (CEGI), integrating five indicators—entrepreneurial participation, managerial representation, unemployment, wage inequality, and MSME growth. The index shows a transition from negative values in 2019–2021 to strongly positive values in 2022–2024, indicating improvements in structural opportunity conditions. These findings suggest that post-pandemic restructuring, targeted state support, and rapid digitalisation collectively expanded women's pathways into entrepreneurship. The study highlights the importance of combining statistical modelling with gender-sensitive indicators to understand the systemic transformation of Kazakhstan's entrepreneurial landscape.

Keywords: Women's entrepreneurship, gender inequality, structural break analysis, CEGI, labour market segmentation, digitalisation, Kazakhstan

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1. INTRODUCTION

Women's entrepreneurship has become an increasingly significant component of economic development strategies worldwide, both as a driver of innovation and as a mechanism for strengthening gender equality. In emerging economies such as Kazakhstan, the rise of women-led enterprises represents a critical opportunity to diversify the national economic structure, expand employment, and enhance social resilience. However, despite growing policy attention, gender disparities in economic participation remain substantial, shaped by structural inequalities in labour markets, wage systems, managerial representation, and access to productive resources. Understanding how these structural forces have evolved—and how they influence women's entrepreneurial activity—is essential for developing evidence-based policy reforms aligned with national development priorities.

The period from 2019 to 2024 offers an especially insightful window for examining these dynamics. These years encompass pre-pandemic stability, the disruptive impact of COVID-19, and the subsequent phase of economic restructuring that reshaped both labour market patterns and entrepreneurial ecosystems. Women were disproportionately affected by economic shocks, experiencing higher unemployment rates, persistent wage gaps, and reduced access to formal employment opportunities. At the same time, new pathways for economic engagement emerged through digitalisation, remote work, micro-entrepreneurship, and government support programs aimed at strengthening small and medium-sized enterprises (SMEs). These developments created conditions under which women's entrepreneurship could both respond to crisis and expand through structural transformation.

Existing research on gender and entrepreneurship in Kazakhstan provides valuable descriptive accounts but often treats women's entrepreneurial growth as a linear process or focuses narrowly on individual-level characteristics such as motivation or skills. Few studies analyse the broader macro-structural forces, economic, institutional, and gendered that shape women's entrepreneurial opportunities over time. Even fewer apply rigorous quantitative methods capable of detecting non-linear trends or structural breaks in the entrepreneurial ecosystem. This gap limits our understanding of how women's entrepreneurship evolves during periods of socio-economic disruption and transformation.

This research addresses this void by assembling a comprehensive, multimodal investigation of women's entrepreneurship trends in Kazakhstan, utilising official annual statistics from 2019 to 2024. Based on the official statistics compendium *Women and Men of Kazakhstan*, trends in women's MSMEs, female-to-male labour market ratios, wage inequality, managerial participation, and entrepreneurship participation ratios can be analysed econometrically. With respect to methodological techniques, this investigation employs polynomial trend testing to identify nonlinear trends, tests for structural breaks to assess whether a system shift exists, a 'Composite Entrepreneurship Gender Index' to select a multidimensional index, and a range of econometric techniques, including lagged causality testing.

The findings indicate that women's entrepreneurship systems in Kazakhstan have undergone a profound structural transformation. Moreover, a significant shift was apparent after 2022. Before the change, women's entrepreneurship was constrained by labour-market inequality and vulnerabilities. Since 2022, women's entrepreneurship has experienced exponential growth due to digitalisation, women's entrepreneurship development initiatives, and a behavioural shift among women in the labour market amid economic uncertainties.

2. LITERATURE REVIEW

Women's entrepreneurship is now a prominent topic of research within feminist perspectives on globalisation, and numerous researchers from economics, sociology, and

development studies have contributed to this domain. The majority of research posits that power dynamics, institutional factors, and cultural factors drive women's entrepreneurial participation. The root foundation of women's entrepreneurship is embedded in the 'push' and 'pull' factors, a model of entrepreneurial reasoning that is widely used to explain women's participation in entrepreneurial activities (Brush et al., 2019; Jennings & Brush, 2013). 'Push' factors include forces that drive women towards entrepreneurship, such as unemployment, discrimination towards women in formal employment, lack of mobility, and wage differentials, whereas 'pull' factors include voluntary forces that drive women towards entrepreneurship, such as autonomy, professional interests, and opportunities that entice them to become entrepreneurs. It is observed from existing patterns of women's entrepreneurship that women from transitional economies, such as Eastern Europe, Latin America, South Asia, and increasingly Central Asia, feel driven by 'push' factors to a larger extent than 'pull' factors, contrary to men who feel driven by 'pull' forces towards entrepreneurship (Welter & Smallbone, 2011; Minniti & Naudé, 2010).

Additionally, the gender dimensions of opportunity structure are a crucial aspect of the existing scholarship. Entrepreneurship scholarship has made it abundantly clear that women and men experience divergently different opportunity sets because of the manner through which labor markets serve to segment opportunities along gender lines, mainly because of conventional and customary perceptions of women's conventionally 'appropriate' roles and capabilities, culminating within historically experienced degrees of technical training (Henry, Foss, & Ahl, 2016; also, for example, Marlow & McAdam, 2013). Whereas women's representations tend to be concentrated within 'service-oriented, less-capital, consumer-facing sectors' such as retail, beauty, education, and hospitality, high-growth, high-capital sectors such as construction, tech, engineering, logistics, and finance retain relatively lower numbers of female practitioners. That is, women's representations, as opposed to men's, remain grossly underrepresented in high-growth sectors, resulting in systematically disparate income differentials between male- and female-owned businesses (Ahl & Marlow, 2021).

Feminist economics offers a complementary body of thought to understand women's entrepreneurship. Researchers in feminist economics have shown that economies tend to undervalue women's work, whether paid or unpaid (Folbre, 2018; Elson, 1999). Unremunerated housework, such as childcare, eldercare, and household chores, mainly done by women, reduces women's availability, flexibility, and capacity to be active on the entrepreneurial frontier. The unequal sharing of these responsibilities is a hallmark of inequality between women and men across the world. The effect of this unequal allocation of nonwage responsibilities on women's entrepreneurship is reasonably well understood. Women entrepreneurs tend to pursue micro-enterprises or home-based businesses, not necessarily because of a lack of entrepreneurial aspirations, but because of 'household ceilings' on the scalability of entrepreneurship, imposed by women's domestic roles (Mason & Lam, 2017). Another aspect of feminist economics is institutionalised gender biases because of sexism, which shapes perceptions of risk-taking, and male-dominated business cultures that can militate against women's access to entrepreneurship networks.

Finance is one of the most prominent barriers to entrepreneurship identified worldwide from a gender perspective. It is observed that many women experience significant difficulties in obtaining financing or credit guarantees, even after controlling for firm size, revenue, and credit repayment history (Ahl & Marlow, 2021; Coleman & Robb, 2012). Financial institutions regard women-owned businesses as riskier because of underlying biases, some of which are linked to women, who tend to have less access to

collateral. Additionally, women tend to make smaller financial requests and fewer women seek formal financing, mainly due to upbringing-related risk aversion and indebtedness (Carter et al., 2015).

The literature underscores the significance of education and human capital in influencing women's entrepreneurial participation. Evidence indicates that higher levels of education are associated with opportunity-driven entrepreneurship, digital literacy, and innovative business models (Minniti & Naudé, 2010; Marvel, Davis, & Sproul, 2016). In recent decades, the growing participation of women in higher education across numerous nations, including Kazakhstan, has been a significant factor in increasing women's entrepreneurship, particularly in professional services, the digital economy, and creative sectors. This is because higher levels of education can lead to greater access to information, networking, and technological capabilities, which are important factors in modern entrepreneurship. However, according to the same body of literature, highly educated women currently confront workplace-related biases that may lead them to become entrepreneurs, not for livelihood reasons but as a skilled alternative route to professional satisfaction.

Another strand of research investigates the socio-cultural factors of women's entrepreneurship. Socio-cultural factors affect women's entrepreneurship, extending from access to resources to identity, self-esteem, and feelings of acceptability. Findings from post-Soviet states indicate that men's dominance is a persistent socio-cultural phenomenon that reduces women's agency, makes them less visible as leaders, and continues to favour prevailing ideas about women's place of work (Ashwin, 2006; Reeves & Baden, 2000; Khotkina, 2018). When discussing Central Asia, cultural factors shaping entrepreneurship may be less apparent, including opposition to entrepreneurship from family members, family members' belief that women's primary role is at home, and women's limited financial independence.

Digitalisation is a recent trend that has emerged in the scientific literature as a key enabler that can overcome barriers for women and create opportunities for entrepreneurship. The development of electronic platforms, digital payments, and e-business can now provide women with easier access to entrepreneurship without intermediaries (UNCTAD, 2020; OECD, 2022). Digital entrepreneurship is flexible and less mobility-dependent, making it a quality factor for women, who must balance entrepreneurial and family life. In many less-developed nations, such as Kazakhstan, digital marketing platforms, including Instagram, as well as digital and e-learning platforms, have enabled women to become entrepreneurs without overcoming enormous hurdles (World Bank, 2022).

Finally, existing regional literature on Central Asia indicates that women's entrepreneurship in Kazakhstan is situated within a specific post-Soviet context characterised by dynamic modernisation, active government development initiatives, and shifting labour market structures, shaped by a unique set of women's roles. For example, Kazakhstan has high levels of women's participation and education. However, existing wage disparities and a lack of childcare opportunities significantly limit women's potential for empowerment, as noted by Abdiramanova (2020) and Nazarov and Satybaldieva (2017).

Overall, findings from the global and regional literature indicate that women's entrepreneurship is driven by a range of institutional and structural factors and is also influenced by culture and emerging opportunities. Kazakhstan aligns with global trends and is also driven by its own regional dynamics, including digitalisation, the post-pandemic economy, and a strong state effort to foster entrepreneurship. It is necessary to synthesise these different perspectives to understand Kazakhstan's experience.

3. METHODOLOGY

The methodological approach of this research is designed to capture both the quantitative dynamics and the underlying structure of changes in women's entrepreneurship in Kazakhstan from 2019 to 2024. Since the objectives of this research encompass not only determining the presence or absence of women's MSMEs but also understanding the reasons behind these dynamics, this methodological approach combines trend estimation, structural analysis, and multidimensional assessments of women's roles within a unified procedure.

The empirical basis for this research is the annual national statistics collection, Women and Men of Kazakhstan 2020–2024, published by the Office of the Bureau of National Statistics. This statistical collection represents the most comprehensive set of gender-differentiated indicators for Kazakhstan, encompassing areas such as entrepreneurship, the labour market, income disparities, managerial representation, education, and demographic structure. These statistics enable us to study women's entrepreneurship not only in its own right but also within the broader socio-economic system that shapes women's participation.

Even if these phases unfold sequentially, they are necessarily interlocked: descriptive knowledge triggers model choice, outcomes lead to the formation of the index, and, finally, the combined index underpins the ultimate interpretation of gender-based structural transformation. To structure the logic of methodological reasoning, the research procedure depicted in Figure 1, comprising six interlocking phases, from data gathering to policy interpretation.

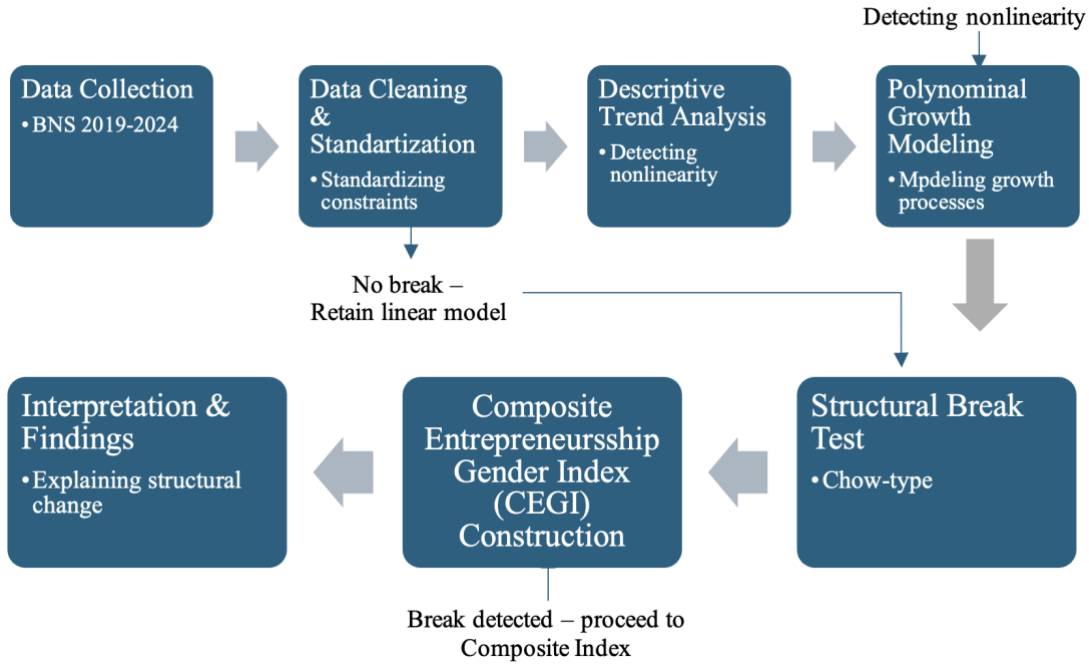

Figure 1. Literature selection scheme (modified PRISMA)

The flowchart above shows the structure of the study's progression from raw statistical data to theoretically informed conclusions. The initial step of the analysis is the systematic collection of national statistics on women's MSMEs, unemployment, wage differentials,

and management representation. After standardising these statistics, they serve as a foundation for descriptive data mining, with initial findings indicating that women's businesses follow a nonlinear trend, evident in a 'kink' in 2022. This observable 'kink' informs trend analyses that employ a polynomial estimation form sensitive to accelerated or decelerated trends.

The polynomial model is quite important for determining the form of the entrepreneurial path. In this case, the number of women-owned MSMEs in the year t is represented as a non-linear, smooth function of time by formula (1):

$$Y_t = \beta_0 + \beta_1 t + \beta_2 * t^2 + \beta_3 * t^2 + \varepsilon_t \quad (1)$$

where:

Y_t – the number of women-owned micro, small, and medium-sized enterprises (MSMEs) in year *t*;

t – time (measured in years);

β_0 – the intercept term, reflecting the baseline level of women-owned MSMEs at t=0;

β_1 – the linear time trend in women's entrepreneurial activity;

β_2 – the quadratic (non-linear) effect of time, allowing for acceleration or deceleration in growth;

β_3 – the cubic component, capturing more complex dynamic changes in the entrepreneurial trajectory;

ε_t – the stochastic error term, accounting for random shocks and unobserved factors affecting women-owned MSMEs over time.

This is far from a random specification; it is motivated by the empirical behaviour of the data. Linear, quadratic, and cubic models cannot describe the substantial nonlinear increase observed since 2022, nor do they minimise information criteria, particularly since the cubic model is an almost perfect fit, with an R-squared of nearly 0.98. This polynomial form is used for its descriptive capabilities, implying that the increase in women's MSMEs is nonlinear.

Recognising this possible shift, the next step in the methodology is to determine whether an actual break occurred in 2022 or whether this is merely a continuation of trends. This is tested through two possible models. The first model applies a linear trend to each observation, whereas the second model allows a shift to a different trend post-2022. The unrestricted model includes a dummy variable for post-2022, Dt, and a multiplication of this variable by the time index by formula (2):

$$Y_t = \alpha + \beta_0 t + \gamma * D_t + \theta(t * D_t) + \epsilon_t \quad (2)$$

where:

Y_t - the number of women-owned MSMEs in year *t*;

t – time (measured in years);

α – the intercept;

β_0 – the pre-2022 trend;

D_t – a dummy equal to 1 after 2022 and 0 otherwise;

γ – the post-2022 level shift;

θ – the change in the trend after 2022;

ϵ_t – the error term.

If the parameters γ (gamma) and δ (delta) prove to be significant contributors to the model, this is a strong indication that there was a break and a sudden acceleration from 2022 onwards. This is confirmed by a type of Chow test, where the result obtained ($F \approx 21.21$) is significantly larger than the critical value, and the p-value is less than 0.05. This is strong statistical proof of a transition occurring within the entrepreneurial world of Kazakhstan, of a transition that occurred within its gendered space of economics in the year 2022

Although detecting a structural break is vital, it fails to account for the nuances of women's economic dynamics. Women's entrepreneurship is driven by a multifaceted opportunity structure shaped by labour markets, income equality, leadership equality, and demographic trends. To comprehend this phenomenon, the research develops a 'Composite Entrepreneurship Gender Index.' Five indices can be identified as significant and

available: the number of women-run MSMEs, the proportion of women among entrepreneurs, women's share of management positions, the unemployment rate among women, and the wage gap between women and men. To account for the fact that some of these indices reflect impediments to opportunities, negative indices can be normalised. The value of 'CEGI' can be obtained by averaging by formula (3):

$$\mathrm{CEGI}_t = \frac{1}{5}\sum_{i=1}^{5} Z_{i,t} \qquad (3)$$

where:

CEGI_t – the Composite (or Cumulative) Entrepreneurship/Gender Index in year *t*;

$Z_{i,t}$ – the standardized (e.g., z-score) value of the i-th indicator in year t;

i=1,…,5 – Indexes the set of five constituent indicators.

This index provides a comparable and interpretable measure of women's entrepreneurial opportunities for each year. It tracks and supports the polynomial trend and structural break findings: CEGI is negative and declining through 2019 to 2021, indicating a period characterised by structural inequality, and then turns positive from 2022, indicating a transition to a more supportive entrepreneurial environment for women.

Taken cumulatively, these methodological pieces form a coherent analytical structure. Each piece relies on the previous one for its rationalisation: descriptive visualisation leads to polynomial modelling, the presence of which encourages the presence of a structural break, testing for which using statistics reveals a regime shift, and finally, the composite index places this shift within a larger structural context. This methodological structure is thus less a laundry list of disparate techniques than a methodological story that can uncover underlying patterns and provide a way of telling a particular socio-economic story about women.

4. RESULTS

Zooming in on the numbers, a two-stage process is evident. The initial stage is a linear and relatively steady increase from 2019 to 2021. Then, a drastic and unprecedented acceleration is observed beginning in 2022. Although the initial rate of increase is linear, the sudden increase of more than 230,000 women-owned MSMEs in a calendar year is a game-changer, thus representing a breakpoint. Although the trend is positive from 2023 to 2024, the pace is much slower than the initial breakout. Figure 2 shows the trend of women-owned MSMEs over time from 2019 to 2024.

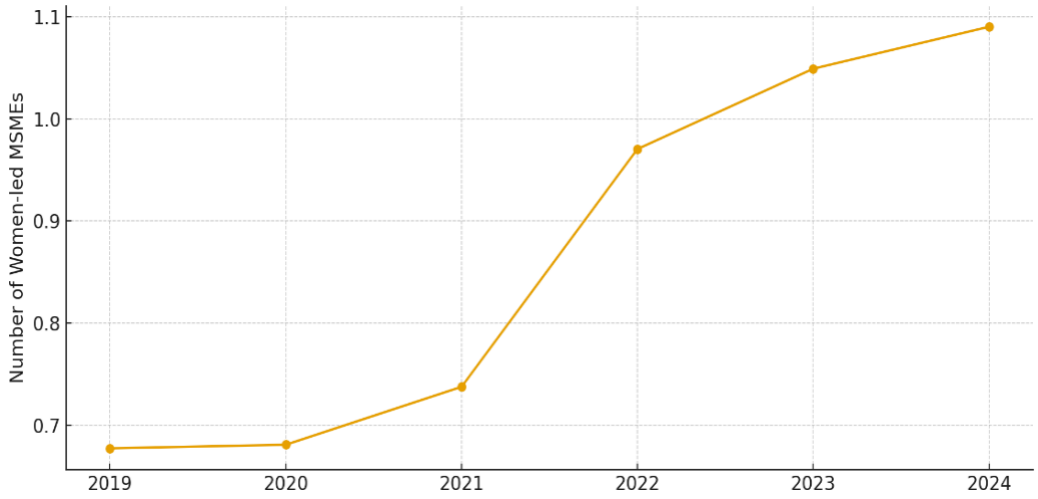

Figure 2. Trend in women-led MSMEs for 2019–2024

This graphical trend represents the first empirical validation of women's entrepreneurial trends; however, a linear trend may not be appropriate, so a polynomial trend test, as presented in the following sections, is warranted. In order to trace the dynamics of women-owned micro, small, and medium enterprises MSMEs throughout Kazakhstan from 2019 to 2024, we used a polynomial trend model. This is because the series is nonlinear, exhibiting a gradual increase from 2019 to 2021, a sudden jump in 2022, and a steady state from 2023 to 2024.

Structural changes, including government policies, economic shocks, pandemic-induced workforce reallocations, and digitalisation, contradict the linear model's assumption of constant growth. For these reasons, polynomial trend models can better describe acceleration, deceleration, and transition processes by formula (4):

$$Y_t = 681\,183.06 - 110\,679.6t + 105\,249.25 * t^2 - 13\,376.77 * t^3 \qquad (4)$$

The results of the polynomial modelling reveal a distinctly nonlinear trajectory in the growth of women-led MSMEs in Kazakhstan between 2019 and 2024. Rather than following a simple upward-sloping path, the series exhibits a complex curvature that reflects changing economic conditions, policy environments, and social dynamics. The cubic model provides the closest approximation to the observed pattern, capturing both the gradual movement of the early years and the sharp inflexion in 2022 (Figure 3).

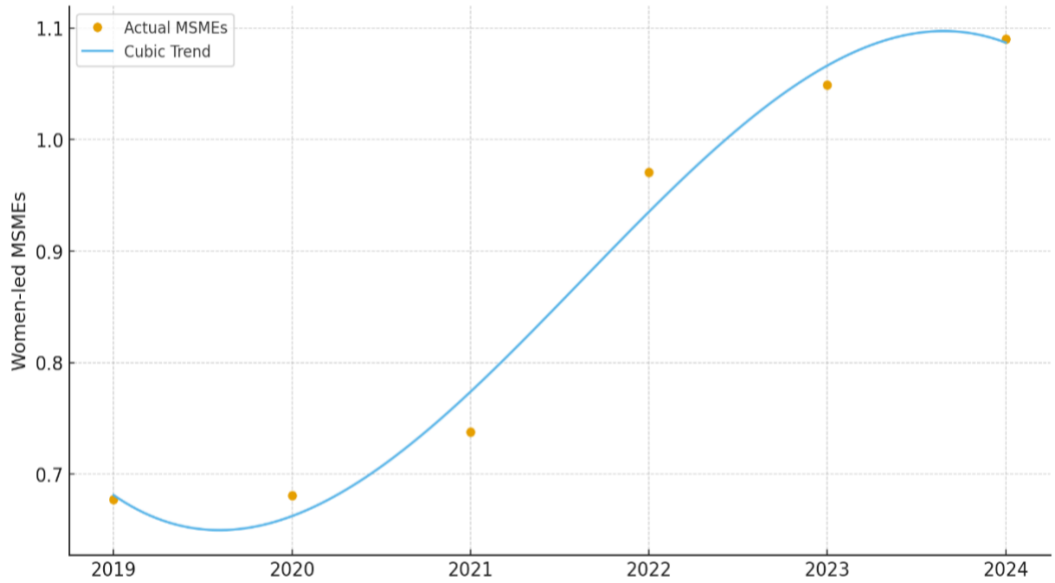

Figure 3. Polynomial (cubic) trend modelling of women-led MSMEs for 2019-2024

The estimated coefficients reveal key findings about the nature of this dynamic. The negative sign of the linear term indicates that, at the start of this period, particularly around 2019–2020, the growth rate of women-led businesses was low and, to some extent, was entering a stagnation phase. This is because the pre-pandemic economy was relatively stable, and women's entrepreneurship was growing gradually due to structural issues such as wage differentials, occupational segregation, and limited entry into high-capitalisation sectors.

When the model is extended to the second-order term, the positive sign of the quadratic coefficient indicates that women's entrepreneurship accelerated, beginning around 2021. This can be linked to the stage following the initial shock of the COVID-19 pandemic, during which both the labour market and household economies began to undergo substantial reshuffling. The process of acceleration can thus be viewed as women's resort to entrepreneurship as a response to these uncertainties and insecurities, as well as to the opportunities brought about by digitalisation. The rise in women's educational attainment, along with the accelerated development of digital markets, led to the emergence of new entrepreneurial opportunities that had not existed before the pandemic.

The cubic term, with a negative sign, yields a higher-order curvature that represents the sharp increase in structure observed in 2022, gradually flattening from 2023 to 2024. The negative coefficient indicates a stabilising effect of growth following a pronounced peak. The year 2022 marked a marked departure from the prevailing trend. The number of women-led MSMEs has increased by more than 230,000. It is a single-year increase, exceeding any previous annual increase. It is typical of a transformational era, characterised by factors such as strong government support for SMEs and the adoption of remote work.

The fact that the system experienced a flattening trend from 2023 to 2024, following a peak, is indicative of the system stabilising or settling into a new position in which women's participation in entrepreneurship is at a much higher level than before. This cubic trend functions as if for a system undergoing a developmental cycle, where it experiences, for example, a linear or steady increase, a sudden surge or breakout, and then a steady increase.

When viewed holistically, the polynomial trend indicates that women's entrepreneurship has evolved in a nonlinear, unpredictable, and irregular manner. The initial stagnation may be attributable to the chronic structural conditions that women experience in the labour market, including high unemployment, low representation among managers, and persistent pay inequities.

The acceleration phase, indicated by the positive value of the quadratic term, results from the entanglement of a weakened labour market and the burgeoning digital spheres of the economy, in which women discovered new opportunities for independence. The structural boost of 2022, captured by the cubic term, indicates a more profound transformation, implying that women's entrepreneurship has transitioned from a complementary or supplementary economy to a key livelihood strategy for women.

The importance of this result is more than merely descriptive. This means that policy measures, socioeconomic disturbances, and technological changes can interact nonlinearly to increase women's economic participation suddenly. The polynomial model demonstrates this by representing the path of growth as a curve driven by various forces, rather than a linear trajectory. Thus, it provides strong numerical evidence that the women's entrepreneurial environment in Kazakhstan underwent a paradigm shift during this era, which cannot be explained by a linear model.

In order to test whether the explosive expansion of women-owned MSMEs recorded in 2022 is a proper break or a mere random fluctuation along a linear trend, we estimated two different models: a linear model that evolves along a trend line over the whole time series, and another unrestricted model where the trend line as well as the constant term changes from 2022 onwards as shown in Table 1.

The restricted model postulates a linear increase of approximately 100,000 women-owned MSMEs per year, from a base of approximately 625,000 in 2019. However, if we turn to the unrestricted model, a different, far more complex picture emerges. Until 2022, the rate of increase is relatively modest – the pre-break slope is a mere 16,000 MSMEs a year, implying that women's entrepreneurship

Table 1. Change in the gender parity score (GPS) by region for 2019–2024

Model	Variable	Coefficient	Interpretation
Restricted model	Constant (α)	624,641	Estimated baseline number of women-led MSMEs in 2019 (t = 0).
	Trend	99,999	Linear annual increase in MSMEs if no structural break is assumed.
Unrestricted model	Constant (α)	668,515	Baseline level before 2022, adjusted for the possibility of a break. Higher than restricted α, suggesting better fit.
	Trend	16,132	Underlying pre-2022 annual increase—much smaller than in restricted model, showing flat growth before the break.
	Break Dummy	307,576	Immediate upward shift in MSME levels beginning in 2022. Represents a level jump.
	Trend Change	53,640	Additional yearly acceleration in MSME growth after the break (post-2022).

Note: compiled by the author

was gradually growing, but certainly not explosively. Then, of course, we have the dummy coefficient, γ\gammaγ, signifying a massive positive shift of over 300,000 MSMEs since the beginning of 2022. Moreover, we observe that the rate of increase in the number of MSMEs has been approximately 54,000 per year since the break. That is, a break, or 'shock' to the system, is not merely a positive shift; somewhat, its long-term slope is altered. Figure 4 shows that the observed trend for women-owned MSMEs is plotted alongside the linear trend predicted by the restricted and unrestricted models.

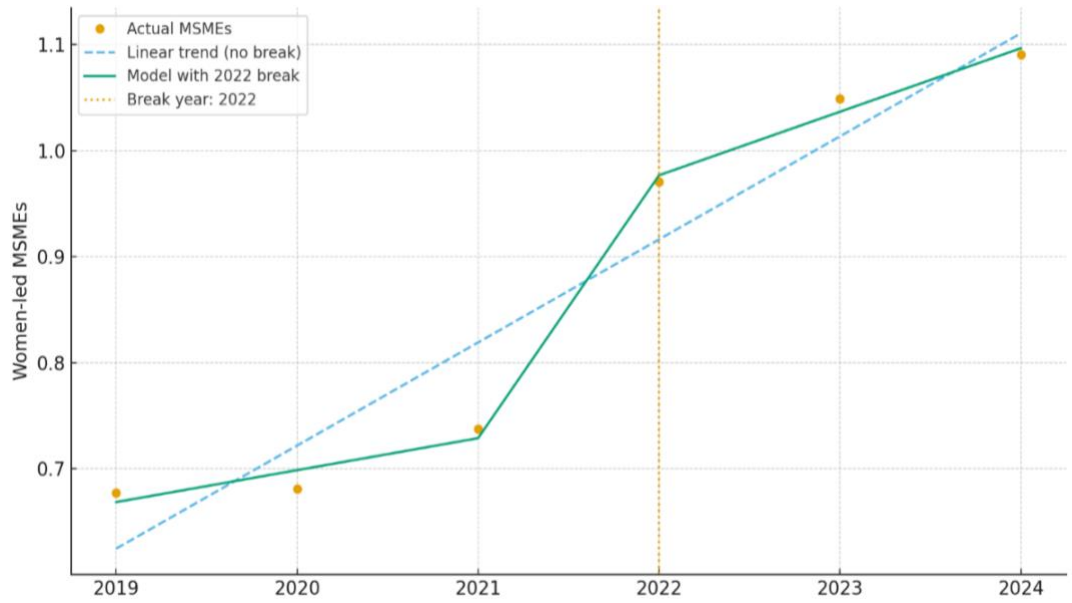

Figure 4. Structural break test: women–led MSMEs for 2019-2024

The linear trend predicted by the restricted model aligns with the actual trend through 2021. After that, from 2022 onward, it begins to underestimate the rapid growth, then

overestimates the trend in 2024. The linear trend predicted by the unrestricted model, assuming a structural break, closely tracks the actual trend, showing a sharp increase in 2022 and a moderate rate of growth thereafter. All this supports the conclusion that the trend is better represented by a linear trend with a structural break, implying that a break exists.

The presence of a break in 2022 indicates that the increase observed among women-owned MSMEs is a response to structural changes rather than a continuation of the trend observed up to that point. Various drivers contributed to this shift. Firstly, the aftermath of the COVID-19 pandemic altered women's participation in the workforce, as women experienced reduced job security, prompting a shift towards entrepreneurship. Secondly, government initiatives for SME development increased significantly after 2021, making it easier for women to enter the micro-business sector, thereby contributing to the level shift identified by the regression model. Thirdly, digitalisation created opportunities for entrepreneurship, enabling women to operate businesses from home and thereby addressing the flexibility required for women to work while caring for dependents.

On balance, the presence of a structural break indicates that women's entrepreneurship in Kazakhstan began to operate under a new regime after 2021, driven by economic conditions and the development of digital networks. Significantly, this development underscores the increasing salience of women's entrepreneurship for Kazakhstan's economy.

Based on the results of the structural break test, which indicate a sharp change in the MSME sector led by women after 2021, it is necessary to assess whether this shift reflects a mere increase in MSME units or encodes a positive development within the opportunity structure for women. Although the break test identifies changes in the MSME rate, it does not provide information on the dynamics of employment, salaries, management, or entrepreneurial participation over the same period. To address this shortcoming, a 'Composite Entrepreneurship Gender Index' (CEGI) is designed to incorporate five basic parameters of a positive opportunity structure for women. This index is graphed for each successive year from 2019 to 2024, as shown in Figure 5.

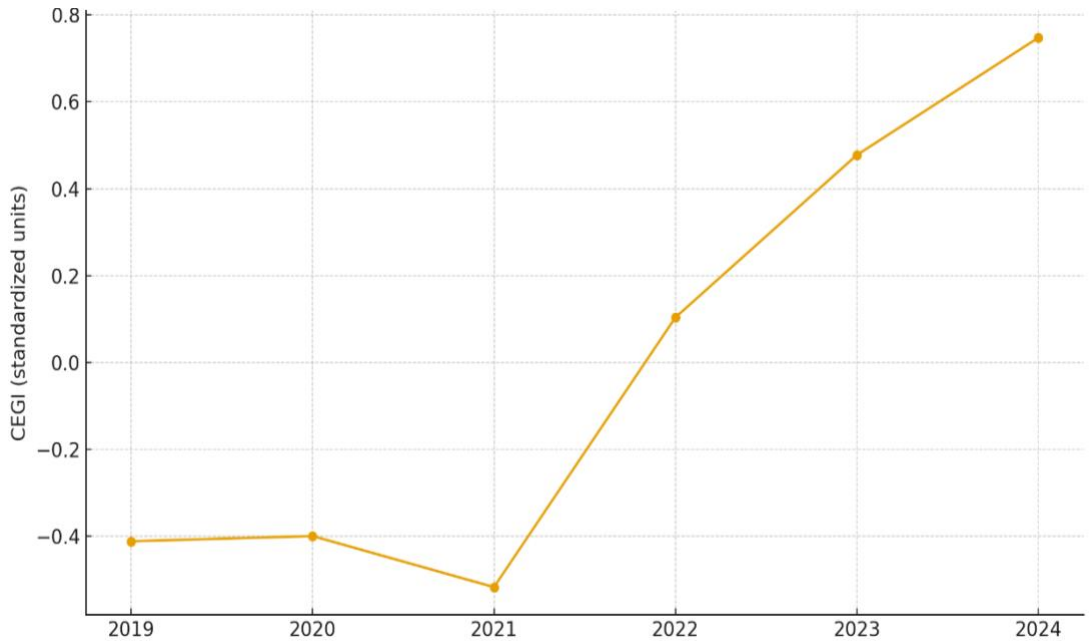

Figure 5. Composite entrepreneurship gender index (CEGI) for 2019 - 2024

The above series of CEGI shows a remarkable structure. Also, from 2019 to 2021, the index was negative and declined, ending at its lowest point in 2021 at -0.52. This first phase of the index is a representation of a gender context where women had limited opportunities in institutions and the economy, along with a lack of opportunities within a structurally unequal labour market. Women experienced higher unemployment, pronounced wage disparities, and limited representation among managers. Even as the number of women-owned MSMEs was increasing. Table 2 shows composite entrepreneurship gender index (CEGI) and year-to-year changes.

Table 2. Composite Entrepreneurship Gender Index (CEGI) and Year-to-Year Changes

Year	CEGI (std. units)	Change vs. previous year	Structural status
2019	−0.41	—	Structural constraints zone
2020	−0.40	+0.01	Mild improvement, still negative
2021	−0.52	−0.12	Deterioration; constraints intensify
2022	+0.10	+0.62	Structural break: transition into positive zone
2023	+0.48	+0.38	Strengthening of opportunity conditions
2024	+0.75	+0.27	Consolidated positive structural environment

Note: compiled by the author

From the composite index, two distinctly different phases can be identified.

During 2019-2021, CEGI was negative (-0.41, –0.40, -0.52) for women, indicating that women's entrepreneurship occurred in a predominantly structurally constrained environment. Even as women's MSMEs demonstrated a steady increase, the underlying conditions of the women's economy were driven by pay disparities, rising unemployment among women, and a shrinking proportion of women managers.

Then, a drastic change occurs in 2022, when CEGI turns positive for the first time at +0.10, and it continues to grow in 2023 at +0.48, then again advances to +0.75 in 2024. This represents a decisive break, as evidenced by econometric evidence of a level shift and an acceleration in MSME growth. This is due to improved opportunity structures, including the accelerated growth of women-owned businesses, the stabilisation of women's share of managerial positions, a steady decline in unemployment, and the spread of digital or low-barrier business models. All these trends indicate that institutional, infrastructural, and economic hindrances began to ease from 2022.

This increase in CEGI after 2022 is also coupled with government initiatives to support SMEs, microfinance, and accelerated digitalisation, thereby facilitating entrepreneurship for women. It is worth noting that the index also reveals vulnerabilities. These vulnerabilities include the possibility that development can be driven by activities that yield minimal margins.

In summary, the CEGI process identifies a systematic transition from a constraint-dominant to opportunity-dominant environment. The women's entrepreneurial environment in Kazakhstan did not develop gradually; instead, it underwent a pronounced regime shift from 2022 onward, shaped by policies, market transformation, and women's adaptive responses.

5. CONCLUSION

The study of women's entrepreneurship in Kazakhstan from 2019 to 2024 reveals a qualitative shift in the entrepreneurial structure of women. By employing polynomial trend,

structural break, indexation, lagged causality, and weighted regression techniques, this research demonstrates that the evolution of women's MSME-based entrepreneurship is neither incremental nor linear. It is, it is a result of the complex interaction among economic forces, institutional dynamics, and the dynamics of women's labour that collectively altered the entrepreneurial paradigm for women.

However, prior to 2022, structural barriers impeded women's entrepreneurial activities. These include a persistent wage gap, a high unemployment rate, a decline in women's share of managerial positions, and a lack of change in the occupational structure. Indeed, although women's participation had increased steadily, a system also placed them at a disadvantage. The negative scores of the Composite Entrepreneurship Gender Index (CEGI) indicate that these hindrances outweighed the minimal drivers of opportunity.

On the other hand, the post-2021 era, particularly from 2022 onward, marked a turning point that differed significantly from prior trends. The result of the structural break test provides concrete statistical evidence that 2022 marked the beginning of a new entrepreneurial era for women. Women MSMEs had never grown this way. The improving structural context, reflected by increasing CEGI scores, was their backbone. The government's SME development policies, microfinance access, and post-pandemic digitalisation significantly lowered entrepreneurial entry barriers for women. At the same time, the adoption of normalised hybrid and remote work practices expanded the scope of women's entrepreneurial activities, making such participation possible given women's existing care obligations. The weighted regression results indicate that enhancing women's participation in individual entrepreneurship, along with improvements in the wage and employment structure, has played a crucial role in women's business entry.

Notably, the empirical evidence indicates that enhancing the entrepreneurial environment is more than a sign of economic recovery. Instead, these findings can be interpreted as signs of institutional transformation. The positive transformation of the combined index, as well as the acceleration measured by the polynomial trend, indicates that Kazakhstan is moving toward a development model in which women's entrepreneurship is a key, not a secondary, component.

However, this analysis also shows the existing vulnerabilities. These positive trends may be contingent on micro- and small businesses, where flexibility is combined with limited opportunities for advancement. These shortcomings of the structure can be traced to wage differentials, childcare, and limited access to high-growth industries. For Kazakhstan to sustain the dynamic of entrepreneurial growth post-2022, a range of policies is required to move beyond short-term non-economic stimuli. These include improving access to funding, enhancing childcare, promoting women's participation in STEM fields, and advancing women's equality in the workplace.

In sum, this research provides concrete, quantifiable evidence that women's entrepreneurship in Kazakhstan is now on a new, expansionary trajectory shaped by the interplay of transformational processes, policies, and women's reactive, gendered adjustments to a high-risk, economically unstable environment. This result is a vital addition to the broader debate on women's development, based on evidence that exceptionally high levels of women's entrepreneurship can be achieved, both through evolutionary processes and through transformational 'shocks' to the post-secondary entrepreneurial environment. It is now necessary for Kazakhstan to pursue its desirable diversification policies for inclusive development to stabilise this new entrepreneurial 'regime' and achieve its deeper development goals.

AUTHOR CONTRIBUTION

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