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How Emotional Dynamics are Associated with Advertising Recall: Evidence from Facial Expression Analysis in Young Consumers

Gulsanat Bekenova[1]*, Elmaira Orazgaliyeva[2]

Abstract

Background: Emotions elicited by advertisements are known to influence what consumers remember; however, prior studies have often relied on averaged measures. We examined how the dynamics of facial expressions during video advertisements relate to ad recall in young adults.

Methods: In a laboratory experiment, 40 participants watched branded video commercials while their facial expressions were continuously recorded. From these recordings, we derived features capturing emotional intensity and temporal dynamics (e.g., variability, peaks). We then applied correlation analyses and machine-learning classifiers to predict which ads participants would later recall.

Results: Ads with higher recall consistently elicited greater emotional variability. Dynamic facial emotion features accounted for a substantial proportion of the most informative predictors in the final classification model, which achieved an AUC of approximately 0.867. At the same time, overall levels of positive emotion remained a significant predictor of recall, indicating that emotional dynamics complement rather than replace static affective intensity.

Conclusions: Temporal patterns of emotion during ad viewing substantially enhance the prediction of memorability. Monitoring fluctuations in facial expressions provides unique insight beyond static metrics and offers actionable guidance for designing more memorable advertisements.

Keywords: video advertising, machine learning, neuromarketing, facial coding, emotional dynamics

Introduction

Recent transformations in global advertising industry showcases the domination of digital video advertisement in global media balance, e.g. reaching 259 billion dollars in 2024 in USA, showing similar trends in UK, Australia and Kazakhstan as well (IAB UK 2025, IAB Australia 2025, IAB USA, 2025; AACA, 2025). No wonder today's consumers are exposed to an unprecedented volume of advertising messages. In 2025, an average consumer is estimated to encounter between 6,000 and 10,000 ads per day—nearly double the number reported in 2007 (Forbes, 2022). This constant exposure contributes to attentional overload, especially among "digital natives", who switch between media platforms at a rapid pace (MarketingProfs, 2017).

Besides, despite substantial investments in digital video advertising, it remains unclear which ads are remembered by young viewers and which fail to influence memory or behavior (MarketingProfs, 2017). Classic marketing concerns remain unresolved—Wanamaker's famous remark that half of advertising budgets are wasted still resonates today. Currently existing digital metrics (reach, views, impressions etc.) mainly capture exposure, but rarely actual processing. They also do not reflect actual behavioral change—both key for advertising effectiveness. This kind of disconnect between exposure and action emphasizes the need for deeper scientific exploration. And it raises a broader question central to advertising research: which specific aspects of ad exposure actually drive advertising effectiveness like recall, recognition, perceived attractiveness or intention to act?

Given these challenges, the last decades advertising industry has increasingly shifted toward emotions and experiential communication. The "Experience Economy" paradigm posits that sustained brand value stems from emotional impact rather than rational information (Pine & Gilmore, 1998). Empirical work demonstrates that emotionally charged advertisements enhance awareness, recall and loyalty (Byrne et al., 2022). Nonetheless while emotional engagement is recognized as central to persuasive advertising, the mechanisms through which these emotional reactions translate into expected behavioral outcomes remain insufficiently understood. Traditional measures capture only conscious evaluations and dependent on self-report, while a substantial part of emotional processing occurs rapidly, automatically and often outside of conscious awareness. Neuromarketing has emerged as a methodological response by enabling real-time as-

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sessment of consumers' emotional and physiological responses during ad exposure (Byrne et al., 2022). Among its tools, facial-expression-based emotion detection has become one of the most widely used proxy measures, providing a non-invasive and relatively accurate way to track emotional responses during video viewing (Stöckli et al., 2018). Recent literature highlights that such affective signals offer valuable insight into how certain marketing stimuli shape consumer memory and preference, complementing traditional self-report measures (Gupta et al., 2025; Vrtana & Krizanova, 2023).

Despite advances in the field, existing neuromarketing research still faces several gaps. Many studies rely on static or averaged emotional measures across an entire advertisement, overlooking how emotions fluctuate dynamically over time. Systematic reviews emphasize that emotional responses during video ads peak at narrative moments, shift with contextual cues and may or may not align with brand exposure—yet these dynamics are rarely examined in relation to memory outcomes (Gupta et al., 2025). Consequently, it remains unclear whether it is the intensity, timing or temporal trajectory of emotional responses that most strongly associated with advertising effectiveness among viewers.

Therefore, the aim of this exploratory study is to examine how the temporal dynamics of emotional facial expressions during real video advertisements are associated with ad recall among consumers. This study focuses on young digital consumers in Kazakhstan—a rapidly evolving media landscape under-researched in neuromarketing literature.

Based on prior theoretical assumptions, we propose the following exploratory hypotheses:

H1: Dynamic emotional metrics are significantly associated with ad recall among young consumers.

H2: Dynamic emotional features offer better predictive accuracy of ad recall than static average-based emotional metrics.

This study contributes to advertising research by introducing a dynamic approach to measuring emotional responses and by applying facial coding to naturalistic advertising stimuli in a Kazakhstani youth context.

Literature Review

Classic Advertising Effectiveness Metrics and Integration of Neuromarketing Approach

Advertising effectiveness usually refers to how well an ad achieves its intended impact—most commonly evaluated through cognitive, emotional and behavioral outcomes such as recall, preference, attitude, purchase intention (Grigaliunaite & Pileliene, 2016; Prihatiningsih et al., 2024). Nowadays in the context of digital advertising effectiveness is typically measured through metrics like viewability, view-through-rate; more advanced levels include Brand Lift Tests, conversion, incrementality tests, even Marketing Mix Modelling (MMM) to understand how video ads contribute to sales along with other media (IAB, 2014; Google n.d.; Meta n.d.). However, despite their widespread use they provide only a partial view of effectiveness, as they do not fully reflect how deeply an ad was processed or how strongly it is integrated into memory. In adition many of them rely on self-reports which may lack objectivity and does not necessarily reflect actual behavior. Lastly, advanced types like MMM are expensive, require large amount of data and can be limited due to privacy restriction policies. It raises new challenges for marketers and encourages the development of novel approaches to measuring advertising effectiveness in order to address gaps in existing methods.

In order to mitigate these limitations the use of neuroscience for marketing purposes has gained considerable popularity in last few decades—emerging a new interdisciplinary field known as neuromarketing (Ariely & Berns, 2010). Simply put, neuromarketing is the application of brain science to gain deeper understanding about consumer behavior (Lin et al., 2018; Puprediwar & Tapas, 2024) By employing theories and methods of neurobiology it offers objective and evidence-based insights about "what is actually happening?" in consumers body when they are exposed to certain marketing stimuli (Lim, 2018). Reviews indicate that combining such objective indicators with surveys helps explain how emotional narratives and imagery influence brand memory and preferences, going beyond purely declarative measures (Gupta et al., 2025; Singh et al., 2023; Venkatraman et al., 2015).

Facial Action Coding System

One of those objective indicators employed in neuromarketing studies is knows as Facial Action Coding System. Automated facial coding (AFC) has become a widely used method in advertising research to unobtrusively capture viewers' affective reactions. It's based on Ekman's Facial Action Coding System (FACS) which links specific facial muscle movements (action units) to basic emotions (Ekman, 1972; Ekman & Friesen, 1978). Tools such as FaceReader analyzes facial video streams frame-by-frame and estimate the intensity of six basic emotions (joy, surprise, sadness, fear, disgust, anger; recent models include senti-

mentality, confusion and contempt as well), valence (positive and negative direction of emotions), and engagement (overall emotional engagement) (iMotion, n.d.). AFC offers several advantages: it is non-invasive, scalable, and allows for high temporal resolution, enabling researchers to track emotional fluctuations in real time (Stöckli et al., 2018). However, key methodological caveats remain. Classifiers are typically trained on exaggerated, posed expressions, which limits their accuracy for spontaneous, low-intensity reactions in naturalistic settings (Baños-González et al., 2020; Büdenbender et al., 2023). Differences across software systems also reduce cross-study comparability, and the method requires controlled lighting and camera positioning to minimize noise (Küster et al., 2020). Nonetheless it's still a validated relatively precise neuromarketing tool broadly applied for emotional assessment (Stöckli et al., 2018).

Role of Emotions in Advertising Effectiveness

Young consumers represent a particularly challenging and relevant segment for digital video advertising. Studies show that individuals born after 1990 change platforms around 27 times per hour—far more frequently than older cohorts—resulting in approximately a 30 % decline in sustained concentration (MarketingProfs, 2017). Advertisers respond with short videos that rely on strong visual and emotional hooks from the very beginning. In this context, visually or/and emotionally salient content tends to stand out, while slower or purely informational ads are quickly skipped, creating an incline towards creative and entertaining ads with emotionally charged messages.

Emotional engagement has long been recognized as a key mechanism driving advertising impact (Byrne et al., 2022; Lewinski et al., 2014). For example, Teixeira et al. showed that ad content eliciting joy and surprise significantly increased viewer attention and engagement (Teixeira et al., 2012). Similarly, Lewinski et al. (2014) found that greater facial expressions of happiness during an ad were associated with more positive attitudes toward the ad and brand (Lewinski et al., 2014). These attitudinal responses (liking of the ad or brand) are one class of outcomes.

A second class involves behavioral or memory outcomes (e.g. later recall of the ad or logo). Emotional memory theory emphasizes that events accompanied by moderate to high arousal are preferentially tagged for long-term storage (McGaugh, 2003). In video advertising, this implies that scenes eliciting laughter, delight or even fear are more likely to be retained and to influence later brand choice (McDuff et al., 2015). Neuromarketing researchers have begun linking emotions to these outcomes. Previous studies indicate that stronger emotional engagement can improve brand and ad recall, and under certain conditions even increase purchase intention (Baldo et al., 2022). Also, Guixeres et al. reported that neural indicators of affect predicted subsequent ad recall, suggesting emotional arousal helps "cement" an ad in memory (Byrne et al., 2022). Emotional engagement has therefore been identified as a key driver of advertising effectiveness: ads that evoke meaningful affective responses are more likely to be processed deeply and remembered (Pine & Gilmore, 1998; Jiang et al., 2023; Vrtana & Krizanova, 2023)

Dynamic Emotional Signatures and Theoretical Framework

However, these findings are often based on emotional scores which were aggregated by average. Russel's Circumplex model highlights that emotions are highly dynamic rather than static (Russell, 1980). Notably, over the course of an advertisement, emotions typically rise and fall, with discrete peaks emerging at narrative turning points, humorous elements or visually striking scenes. This motivates a deeper examination of how dynamic emotional responses during video ads relate to memory outcomes. Dynamic features such as rise time, peak intensity, duration and variability of emotional episodes can therefore provide richer insight than simple averages. Kühn et al. (2016) found that moment-specific neural peaks, particularly during branding segments, were more predictive of real-world sales than average engagement, emphasizing the importance of when emotions occur (Kühn et al., 2016). Kolar et al. (2021) similarly showed that EEG peaks during brand logo appearances predicted recall far better than post-exposure surveys, reinforcing that emotional timing matters (Kolar et al., 2021). McDuff et al. (2014) extended this insight to facial expressions, demonstrating that temporal dynamics of smiles—not just their presence—correlated with ad liking and memory (McDuff et al., 2014). Even though limited works studied dynamic feature of emotion in context of ad effectiveness, existing ones validate our focus on facial expression dynamics for predicting memory outcomes. These findings resonate with broader emotional memory theories, which argue that "emotional peaks" during an episode serve as markers that intensify encoding. While a stable positive tone can support favorable brand attitudes, ads that lack emotional variability risk fading into the background amid competing stimuli. This provides a theoretical basis for focusing on the temporal structure and contrast of emotional responses—key elements in the present study's dynamic emotional signatures.

Summary and Research Gap

In summary, existing literature agrees that emotions play a central role in advertising effectiveness by enhancing attention, encoding and recall. Neuromarketing approaches, and automated facial coding in particular, provide objective, time-resolved measures of viewers' emotional responses and have been successfully linked to evaluative outcomes such as ad liking and brand attitude. Nevertheless, several gaps remain. First, the temporal dynamics of emotional reactions are rarely examined systematically: many studies rely on static or averaged measures, overlooking how emotion fluctuates across narrative segments and branding moments. Second, although previous studies suggest these mechanisms, facial dynamics in youth-focused ad contexts remain underexplored and under-theorized. Lastly, relatively few studies directly connect dynamic facial responses to subsequent memory outcomes. These gaps justify the present quantitative exploratory study, which uses automated facial coding to capture the temporal dynamics of emotional expressions during youth-oriented video advertisements and links these dynamic emotional signatures to ad recall and other self-reported effectiveness measures. By focusing on the intensity and variability of facially expressed emotions, the study aims to clarify how dynamic emotional responses relate to advertising effectiveness and to assess whether such indicators can complement traditional evaluation methods. This framework directly underlies the two hypotheses formulated in the Introduction.

Methods

Research design and ethical considerations

This study adopts an exploratory, quantitative, lab-based design aimed at examining how dynamic emotional responses to video advertising relate to self-reported measures of advertising effectiveness among young consumers. Facial-expression-based emotion tracking (FaceReader) was combined with post-exposure survey measures. The study represents a pilot stage within a broader project on developing a behavioral model of communicative effectiveness in digital advertising. The experiment was conducted in Almaty Management University. The study was conducted by researchers with prior training in neuromarketing, with no affiliation to any of the brands or stimuli presented, minimizing personal or commercial bias.

All procedures adhered to institutional guidelines, national regulations, and international standards for minimal-risk behavioral research. According to the Model Rules of Scientific Ethics of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Ministry of Science and Higher Education of the Republic of Kazakhstan, 2024) and the Code of Scientific Ethics of the National Academy of Sciences (National Academy of Sciences of the Republic of Kazakhstan, 2023), researchers must ensure informed consent, confidentiality, voluntary participation, and minimization of risks to human subjects. Given the non-invasive design, absence of sensitive content, and stimuli comparable to everyday media exposure, the study falls under the category of minimal-risk research as defined by international guidelines (ESOMAR & GRBN, 2020; U.S. Department of Health and Human Services, 2023). In accordance with both national and international definitions of minimal-risk research, and institutional policy, no formal ethics board review was required. Two participants were aged 17 and provided written assent. In line with ESOMAR-GRBN guidance for research with young people aged 14–17, and given the minimal-risk and non-sensitive nature of the content, parental permission was not deemed obligatory under prevailing ethical standards (ESOMAR & GRBN, 2020). All participants consented voluntarily, signed informed consent, data were anonymized, and post-study debriefings were conducted.

Participants

The sample comprised 40 young people aged 17–21. This age group was chosen because late teens and emerging adults constitute the core active audience for social media and online video platforms in Kazakhstan, and thus represent a natural target for digital advertising (Tribune, 2025). Participants were recruited on a voluntary basis among students of Almaty Management University. All participants self-reported daily use of social media and frequent exposure to online video advertising. The sample was gender-balanced and included students from diverse majors, providing heterogeneity in educational background within a relatively homogeneous age and media-consumption profile. The sampling strategy was one of convenience rather than probabilistic recruitment, which limits statistical generalizability. However, such sample sizes and recruitment procedures are common in neuromarketing and psychophysiological research, where each participant is exposed to multiple stimuli and the focus is on exploratory pattern detection rather than population-level estimation (Vozzi et al., 2021; Kazybaeva, 2022). In this study, each participant viewed all advertising stimuli, producing a participant-stimulus dataset of 240 observations after data cleaning. The findings should there-

fore be interpreted as indicative rather than definitive and will require replication on larger and more diverse samples in future work.

Advertising stimuli

Six video advertisements for fast-moving consumer goods (FMCG) were selected as experimental stimuli. FMCG brands were chosen because they are major investors in video advertising in Kazakhstan (K-Research Central Asia, 2025). All ads were real, locally relevant commercial videos used in the market, rather than artificially constructed stimuli, to preserve ecological relevance. The selection followed several criteria. First, the videos differed in emotional tone and creative strategy, including humorous, sentimental, dynamic/action-oriented and more neutral executions, to elicit a broad range of affective responses. Second, the ads were comparable in basic format: short videos of approximately 30 seconds, horizontal 16:9 ratio and HD quality, which helped to standardize viewing conditions. Third, all ads clearly presented the brand and product and were in a language understandable to all participants. The content was appropriate for a youth audience and did not contain explicit or age-inappropriate material. Together, these criteria ensured sufficient variability in emotional impact while controlling for obvious confounds such as extreme length, technical quality or incomprehensible content.

Procedure

The study was conducted individually in a university classroom setting. After consent, each participant received a brief instruction stating that they would watch several short video ads and then answer questions about each one. The advertising content and specific study hypotheses were not disclosed to avoid biasing responses. Each participant then viewed the six video ads in randomized order to control for potential order effects. The videos were presented on a computer screen at a comfortable viewing distance. A webcam positioned above the screen recorded the participant's face throughout the session. FaceReader (iMotion 10, Affectiva) ran in parallel, automatically analyzing facial expressions in real time and storing a frame-by-frame record of emotional indices at approximately 30 frames per second. Within the constraints of an exploratory laboratory design and limited sample size, facial coding represents a methodologically appropriate compromise between temporal resolution, ecological validity, and feasibility. After each video, participants completed a brief questionnaire assessing ad recall: reflecting the perceived memorability of the advertisement. Rating was provided on 10-point Likert-type scales. This measure served as the primary dependent variable both in correlation analysis and in exploratory predictive modelling. After all six ads and questionnaires were completed, participants were debriefed and given an opportunity to ask questions. This allowed for time-resolved alignment between emotional response and evaluative outcomes at the stimulus level.

Data Preparation and Analysis

Dataset Construction and Preprocessing*:* The raw dataset combined frame-by-frame facial expression recordings with post-exposure survey responses. First, dependent variable—Ad Recall—was examined and transformed as needed. For classification tasks, each outcome was binarized via median split (e.g., high vs. low recall), creating roughly balanced classes. Demographic variables were prepared by converting Gender into binary indicators and treating Age as a numeric feature. The facial expression data (captured by FaceReader software) were cleaned by removing frames with no detected face or all emotion values missing, and categorical identifiers (participant ID, video ID, etc.) were standardized for consistency. Each participant's continuous facial emotion time-series for a given ad was then aggregated into a single exposure-level observation by merging it with that individual's survey outcomes on the same ad.

Feature Engineering—Average (Static) and Dynamic Emotions: To quantify emotional responses, a comprehensive set of features was derived from the facial expression time-series. Static features summarized overall emotional levels during the ad (e.g., the mean intensity of "Joy", "Valence", "Engagement" across the ad). Specifically, for each emotion channel, we computed the average (mean) intensity. By contrast, dynamic features captured temporal patterns and variability in the emotional response. These included the standard deviation of each emotion's intensity over time (as an index of volatility), the range (max-min contrast) of each emotion, and the linear slope of emotion intensity over the ad's duration (indicating rising or falling trajectories) and 90th percentile, and other aggregate metrics. We also recorded the relative timing of peak expression (e.g., the fraction of the ad's duration at which the maximum joy occurred) and split the ad into three equal segments to compute segment-wise emotion means (e.g., Joy_seg1_mean for the first third of the ad, etc.). These temporal features were designed to reflect hypotheses about emotional dynamics. All

engineered features were inspected for outliers and missing values: any infinite values (from slope calculations or entropy measures) were replaced with NaN, and then rows with missing data in any predictor or outcome were dropped to ensure a complete-case dataset for modeling.

Before predictive modeling, we conducted a comprehensive statistical analysis to examine associations between facial emotion-derived features and advertising effectiveness outcomes. Two complementary approaches were used: (1) nonparametric Spearman and parametric Pearson correlations, and (2) one-way ANOVA tests on quantile-based outcome groupings. Emotional predictors were grouped into static (mean-based) and dynamic (variability- and time-sensitive) features. Multiple testing corrections (Bonferroni and FDR) were applied to control for false positives, and post-hoc Tukey tests identified pairwise group differences where applicable.

Train-Test Split and Class Imbalance Handling: After feature extraction, the data were divided into training and testing sets for predictive modeling. We used an 80/20 stratified split, ensuring that the class ratio (e.g., high vs low recall) was preserved in both sets. Stratification was important given a slight class imbalance in outcomes like Ad Recall (approximately 50 % "high" recall vs 50 % "low", with minor deviations). To further address class imbalance during model training, we implemented a sample weighting strategy. Each training instance was weighted inversely to its class frequency (using scikit-learn's class_weight='balanced' formula), so that the classifier paid relatively more attention to minority-class examples. These weights were supplied to the model's training routine (via the sample_weight parameter) to mitigate bias without discarding or oversampling any data. By preserving all observations and applying weights, we aimed to improve the model's recall for the under-represented class while maintaining overall performance.

Modeling Approach and Hyperparameter Tuning: Based on prior testing of several algorithms, we selected an XGBoost gradient-boosted tree classifier as the primary model for predicting binary ad outcomes. XGBoost was chosen for its ability to handle feature heterogeneity and its built-in robustness to collinearity and scale differences in features. An initial grid search was conducted on the training data to fine-tune key hyperparameters. Using 5-fold cross-validation within the training set, we exhaustively searched over combinations of tree depth, number of trees, learning rate, and tree subsampling fractions. The optimization criterion was the mean cross-validated ROC AUC score, reflecting the model's ability to discriminate between classes. The grid search identified an optimal configuration (for Ad Recall prediction) with relatively shallow trees (max depth = 3), a lower learning rate (0.01), and a moderate number of trees (approximately 100 boosting rounds). These tuned hyperparameters were then fixed for the final model training. During training, the sample weights (as described above) were applied, and a validation subset was monitored to prevent overfitting (with early stopping if performance ceased improving). The final XGBoost classifier was thus trained on the weighted training set with tuned settings and then evaluated on the 20 % hold-out test set.

Evaluation and Interpretation Procedures: We evaluated classification performance with several standard metrics: overall accuracy, F1-score (the harmonic mean of precision and recall for the positive class), and Area Under the ROC Curve (AUC) for probabilistic performance. In addition, we examined the confusion matrix on test data to understand the distribution of true vs. predicted positives and negatives. Alongside raw performance, we extracted the model's internal feature importance values (based on information gain) to identify which input features contributed most to the predictions. To add an interpretable layer to the results, we employed SHAP (SHapley Additive exPlanations) analysis on the final model. Using TreeSHAP, we computed contribution scores for each feature for every prediction. This allowed us to generate a global SHAP summary plot (ranking features by average absolute impact on the model's output) and to visualize local explanations for individual instances (illustrating how specific feature values increased or decreased the predicted probability). All analysis steps were conducted in a reproducible Python environment, and the data preparation and modeling pipeline were codified such that the process could be repeated or extended with new data. By the end of this phase, we had a cleaned and feature-rich dataset, a tuned and validated predictive model (XGBoost), and a suite of interpretability tools to help understand the model's decisions.

Results

To test the association between emotional features and ad recall, both correlational and variance-based statistical methods were employed.

Table 1 presents the results of a Pearson correlation analysis between emotional features and the dependent variable Ad Recall. Only features that met the predefined significance threshold ($p < 0.05$) and demonstrated a correlation magnitude of at least |0.2| are included. The table distinguishes between static and

dynamic features, with the majority of statistically significant correlations emerging from dynamic metrics. The strongest associations were observed for standard deviation, 90th percentile, and contrast-based indicators across the Joy, Engagement, and Valence emotion channels.

Table 1. Pearson correlation analysis

№	Aggregation type	Feature	Pearson corr.	p-value
1	*2*	*3*	*4*	*5*
1	Static	Joy_mean	0.215	0.0008
2	Static	Engagement_mean	0.210	0.0011
3	Static	Valence_mean	0.216	0.0007
4	Dynamic	Contempt_max	0.209	0.0011
5	Dynamic	Contempt_contrast	0.210	0.0011
6	Dynamic	Joy_max	0.257	0.0001
7	Dynamic	Joy_p90	0.266	0.0000
8	Dynamic	Joy_std	0.283	0.0000
9	Dynamic	Joy_contrast	0.257	0.0001
10	Dynamic	Engagement_max	0.272	0.0000
11	Dynamic	Engagement_p90	0.239	0.0002
12	Dynamic	Engagement_std	0.272	0.0000
13	Dynamic	Engagement_contrast	0.272	0.0000
14	Dynamic	Engagement_seg1_mean	0.203	0.0016
15	Dynamic	Valence_max	0.276	0.0000
16	Dynamic	Valence_p90	0.279	0.0000
17	Dynamic	Valence_std	0.292	0.0000
18	Dynamic	Valence_contrast	0.267	0.0000

Table 2 summarizes the outcome of one-way ANOVA tests conducted on quantile-based groupings of Ad Recall scores. The features listed passed false discovery rate (FDR) correction at the $\alpha = 0.05$ level. For each feature, raw p-values, Bonferroni-adjusted p-values, and FDR-adjusted p-values are reported, along with binary significance indicators. Notably, multiple dynamic features related to Joy, Engagement, and Valence retained statistical significance after correction.

Table 2. One-way ANOVA test

	Feature	**p_raw**	**Bonferroni**	**FDR**	**Significant_raw**	**Significant_Bonf**	**Significant_FDR**
1	2	3	4	5	6	7	8
1	Joy_max	0.000875	0.086597	0.007872	True	False	True
2	Joy_p90	0.000233	0.023077	0.005769	True	True	True
3	Joy_std	0.000149	0.014721	0.004907	True	True	True
4	Joy_contrast	0.000874	0.086557	0.007872	True	False	True
5	Engagement_max	0.000623	0.061700	0.006860	True	False	True
6	Engagement_p90	0.003336	0.330263	0.027522	True	False	True
7	Engagement_std	0.000590	0.058457	0.006860	True	False	True
8	Engagement_contrast	0.000624	0.061739	0.006860	True	False	True
9	Engagement_seg1_mean	0.005695	0.563766	0.043367	True	False	True
10	Valence_max	0.000513	0.050765	0.006860	True	False	True
11	Valence_p90	0.000139	0.013738	0.004907	True	True	True
12	Valence_std	0.000106	0.010452	0.004907	True	True	True
13	Valence_contrast	0.000479	0.047406	0.006860	True	True	True

Model Performance Across Stages

We evaluated the XGBoost classifier's performance on predicting high vs. low advertising outcomes at three key stages: the initial baseline model, after hyperparameter tuning, and after addressing class imbalance with weighting. Even though, initially 2 types of models were built—using dynamic and static emotional features to test Hypothesis 2—in the end combined model was chosen for further investigation and improvement since it showed better performance among all 3 types. Table 3 summarizes the classification metrics for Ad Recall (the focal outcome) in each stage. The baseline model—trained with default XGBoost parameters on the full feature set—achieved moderate discrimination, with a cross-validated ROC AUC around

0.65 and test-set accuracy about 0.60 (for Ad Recall). After performing a grid search and hyperparameter tuning, the tuned XGBoost reached an AUC of approximately 0.72 on the test set, alongside an accuracy of ~0.70 and a positive-class F1-score of ~0.73 (see Table 3).

Table 3. Summary of model performance across stages

№	Stage	AUC	Accuracy	F1 Score
1	2	3	4	5
1	Baseline model	0.66	0.63	0.62
2	Tuned model	0.72	0.70	0.73
3	Weighted model	0.86	0.75	0.75

Further the class-weighting strategy was implemented. Training the model with sample weights yielded a small uptick in overall accuracy (to ~75 %) and substantially improved the recall for the positive class. As a result, the weighted model achieved an AUC of about 0.86 on the hold-out test set. In the final weighted model, the number of correctly identified high-recall instances increased while false negatives decreased, without inflating false positives. Figure 1's confusion matrix shows that true positives and true negatives comfortably outnumber misclassifications, a pattern not seen in the baseline model.

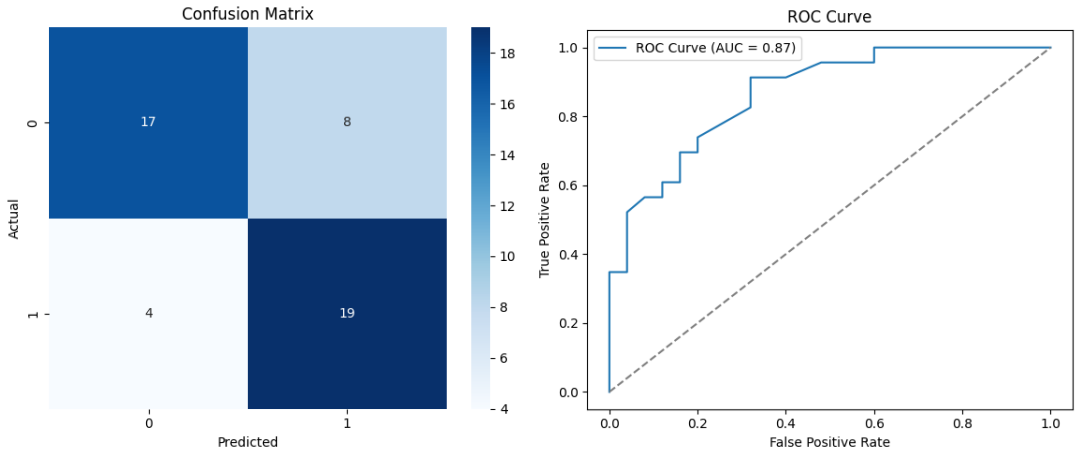

Figure 1. Confusion matrix of the weighted model

Overall, the classification framework outperformed regression attempts (which yielded near-zero or negative R^2 on test sets), affirming that a binary approach (e.g. distinguishing high vs low recall) was more viable given the data characteristics.

Feature Importance Analysis

Feature importance was assessed using SHAP (SHapley Additive exPlanations), which quantifies the contribution of each feature to the model's prediction for individual cases. Figure 2 presents a SHAP summary plot for the final Ad Recall classifier, showing both the direction and magnitude of each feature's impact.

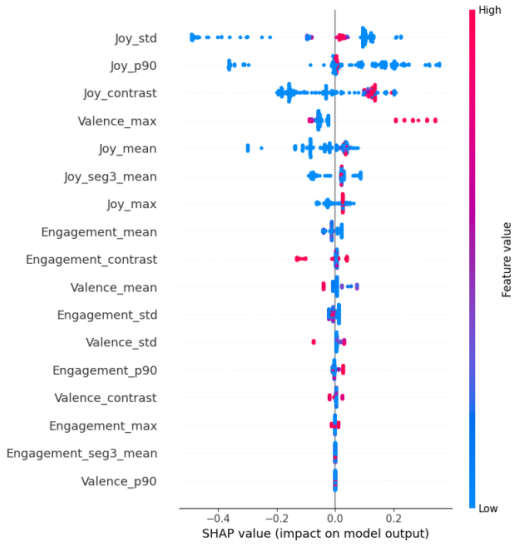

Figure 2. Global SHAP values

Each dot represents one sample's SHAP value for a given feature. The x-axis indicates the direction and strength of the feature's effect on the model output: values to the right increased the likelihood of high recall, while values to the left decreased it. Color denotes the original feature value, from low (blue) to high (red). Several features—such as Joy_std, Joy_p90, and Joy_contrast—display wide horizontal dispersion, indicating strong and variable contributions across instances. For these features, high values (in red) generally align with positive SHAP values, suggesting a tendency to push predictions toward the high-recall class. Conversely, features near the bottom (e.g., Valence_p90, Engagement_seg3_mean) show low dispersion and tightly clustered values around zero, indicating limited influence on predictions regardless of their value range. The overall pattern suggests that specific high-magnitude emotional signals—especially those related to joy and its temporal variability—had the most consistent and substantial impact on the classifier's output.

In addition to global explanations, we examined local SHAP values for individual predictions to illustrate the model's decision logic. The SHAP waterfall plot in Figure 3 visualizes the additive contributions of individual features toward the model's predicted probability for a single high-recall observation. The base value (E[f(x)])—the mean model output across the dataset—is 0.008, the final prediction reached 0.725. Feature contributions are displayed in descending order of impact. Valence_max exerted the strongest positive influence, shifting the output by +0.31, followed by Joy_contrast (+0.14) and Valence_mean (+0.04). Additional moderate contributions were observed from Engagement_contrast, Joy_mean, Joy_std, Valence_std, Engagement_p90, and Joy_max, each contributing between +0.03 and +0.04. Features with negligible effect were grouped under "8 other features". The length of each horizontal bar represents the absolute magnitude of the feature's contribution to the prediction. The annotated values on the left of each bar correspond to the raw input value for the given feature. The cumulative visualization highlights the sequential aggregation of effects that led the model from the baseline prediction to the final output.

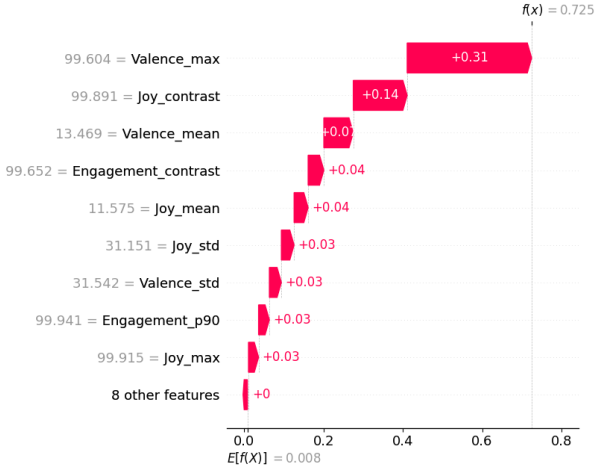

Figure 3. Local SHAP values

Discussion

The results of this study provide clear support for our core hypotheses about emotional dynamics in advertising. First, consistent with Hypothesis 1, we found that dynamic facial expression patterns are significantly associated with advertising effectiveness—most notably with Ad Recall. Both correlation analyses and group comparisons showed that participants who remembered ads tended to exhibit greater emotional variability and intensity during viewing, compared to those with lower recall. This confirms that it's not just whether an emotion is elicited, but how it unfolds over time that matters for memory. For example, high-recall ads were characterized by pronounced surges in joy and engagement, validating the idea that emotional peaks contribute to stronger memorability. This finding aligns well with prior work by Lewinski et al. (2014), who reported that viewers' smiling (a proxy for joy) was positively correlated with their liking and recall of commercials. Our study extends such findings by demonstrating that not only the average level of smiling, but also its dynamics—how much one's smile intensity fluctuates or reaches a climax—is a critical predictor of what ads stick in memory.

The comparative performance of static versus dynamic features addresses Hypothesis 2, which posited that dynamic emotion metrics would enhance predictive power beyond static summaries. The evidence here is nuanced. On one hand, dynamic features (such as standard deviations, contrasts, and temporal slopes) clearly offered additional explanatory value: they dominated the machine learning model's feature importance rankings and improved classification performance for certain outcomes. Models using dynamic features outperformed those using only static means, suggesting that fluctuations in emotions (like moments of surprise or spikes of engagement) differentiate how much an ad entices the viewer. This resonates with Teixeira et al. (2012), who found that temporal patterns of surprise and joy in video ads were key drivers of viewers' continued attention and eventual persuasion. Our results similarly indicate that an ad capable of taking the viewer on an emotional ride—for example switching emotional tone toward a positive resolution—tends to be more effective by certain measures. On the other hand, we also observed that static features retained significant predictive power for Ad Recall, as it was observed in both correlation and feature importance analysis. This suggests that the general valence and engagement level an ad elicits (high vs low overall enjoyment) is still important for memory encoding. The dynamic features then add a finer layer of discrimination: given two ads that are equally positive on average, the one that manages emotional variation or a strong finish will be remembered better. In summary, Hypothesis 2 is partially supported: dynamic measures improve prediction when emotional responses are complex, but basic positive reactions (captured by static means) remain a necessary foundation.

Another notable insight from our study is the particular importance of joy and valence dynamics. Joy (often manifested as smiling or laughter) emerged as the single most influential emotion across analyses. This reinforces a well-established observation in advertising literature: ads that elicit happiness are more likely to engage, as they elicit a rewarding emotional experience (Lewinski et al., 2014; McDuff et al., 2015; Teixeira et al., 2012). Our contribution lies in showing that it is not merely the presence of joy, but its temporal profile that counts. This observation aligns with psychological theories discussed in literature review suggesting that emotional intensity and fluctuation—rather than mere presence—enhance memory encoding. Viewers may not recall content based on a steady emotional state, but are more likely to remember experiences marked by noticeable shifts in affective intensity. In our findings, higher variability and contrast in joy-related expressions were consistently associated with greater ad recall, supporting the idea that dynamic emotional contours, including brief but pronounced surges of positive emotion, contribute to memorability. Thus, our results provide empirical validation, within a facial coding framework, for a principle that creative professionals have long embraced: not just making viewers feel good, but allowing emotional responses to evolve meaningfully over time.

Implications for Theory and Practice

The confirmation that dynamic emotional cues predict ad recall has implications on several fronts. Theoretically, it reinforces the idea that models of advertising effectiveness should incorporate time-based affective factors. Traditional advertising models often include attention, emotion, and memory as linked constructs; our results specify that the temporal structure of emotion (like engagement oscillations or late-emotion peaks) is a critical element linking exposure to memory. This advocates for an integrative framework where emotional dynamics are considered alongside content and frequency effects when explaining why certain ads succeed. Practically, the results offer guidance for advertising practitioners and evaluators. First, the strong performance of joy and engagement metrics implies that facial coding can serve as a valua-

ble early indicator of ad effectiveness. Agencies can use facial expression analysis in pre-test sessions to identify whether an ad elicits the desired emotional ride. If an intended "feel-good" ad only produces mild, flat reactions, it may signal poor memorability—prompting creative rework such as adding a humorous twist or a heartfelt moment to elevate the emotional curve. Second, our use of an interpretable ML model (XGBoost with SHAP explanations) demonstrates a path forward for explainable AI in marketing analytics. Rather than treating predictive models as black boxes, we show that it's feasible to extract human-readable insights (e.g., "variability in smiling is a top predictor of success") that can be fed back into creative strategy. This approach increases trust in AI-driven ad testing tools and helps bridge the gap between data scientists and creative teams via a common understanding of what emotional signals matter. Lastly, the findings suggest that advertisers should focus not only on maintaining a positive emotional tone, but also on designing emotionally dynamic narratives with identifiable peaks that coincide with key branding moments.

Limitations

This research is among the first to systematically combine dynamic facial expression analysis with machine learning to predict advertising success, and it benefits from a rich, granular dataset (frame-level emotion readings across multiple ads). However, several limitations must be acknowledged. One limitation is the sample and stimulus scope: our data were collected on a specific set of video ads and a specific audience. The ads were all of moderate length and from similar genres (e.g., all consumer product commercials), and the viewers were from one country and roughly within a certain age bracket. This homogeneity helped control extraneous variance but also means the results may not generalize to, say, longer narrative advertisements or to viewers from vastly different cultural backgrounds. Another limitation is the reliance on self-reported effectiveness measures which doesn't necessarily reflects actual behavior. Additionally, there are technical limitations in the emotion measurement itself. Facial expression analysis with tools like FaceReader provides a convenient and non-intrusive metric of audience emotion, but it only captures outward expressions. It may miss internal emotions not expressed on the face, and it can sometimes misclassify facial actions (for example, mistaking a nervous smile for genuine joy). This could attenuate the observed relationships—meaning the true effect of emotional dynamics might be even stronger than we detected, if measured with perfect accuracy. Finally, our predictive model, while performing above chance, is not perfect. Even with tuning and weighting, the best AUC of ~0.86 for recall prediction indicates that some recalled ads were indistinguishable from non-recalled ones based on facial expressions alone. This reminds us that advertising effectiveness is a multi-dimensional phenomenon: factors like narrative clarity, branding, viewer motivation, and even audio/music components play roles that facial metrics can't capture. We treat our model as a proof-of-concept for incorporating emotional dynamics, not as a standalone tool to guarantee an ad's success.

It worth noting that these findings should be understood within the broader view that emotions represent internal, multifaceted states, as noted by Anderson & Adolphs (Anderson & Adolphs, 2014). While the current study does not attempt to exhaustively measure emotion, it provides a useful behavioral proxy for exploring their temporal structure.

Future Directions

Building on this work, future research could explore a few promising avenues. One direction is to incorporate additional modalities to complement facial coding—for instance, physiological sensors (heart rate, skin conductance) could capture arousal changes that the face doesn't show, potentially improving predictive power for high-arousal emotions like fear or excitement. And implementing self-declared emotional assessment could validate FaceReader results and provide more holistic picture of internal emotional state. Another extension would be to apply sequence modeling techniques (such as recurrent neural networks or time-series clustering) to the emotion trajectories, rather than reducing them to summary features. This could reveal if specific temporal patterns (e.g., a sequence of surprise→joy→sentimentality) universally lead to better outcomes. We also suggest investigating the causal aspect: experimental studies could manipulate the emotional arc of an ad (creating different edit versions of the same ad—one with a flat emotional profile, one with a rising profile) to directly test the impact on recall and persuasiveness. Such research would solidify whether the correlations we observed indeed reflect causation. Last, but not least, future studies should consider including mediating or moderating variables as well, for example cultural, contextual factors' impact on emotions, and whether cultural differences in emotional expressiveness impact the predictive models.

In conclusion, this study underscores the value of looking beyond static "smile sheets" and instead focusing on the ebbs and flows of emotion. By doing so, it contributes both to academic understanding of how

advertising works and to practical techniques for creating and evaluating more emotionally resonant advertisements.

Conclusion

This research set out to deepen our understanding of how emotional dynamics, as captured through facial expression analysis, relate to advertising effectiveness—within a context of this research—ad recall. In pursuit of this aim, we combined a facial coding dataset of ad viewings with state-of-the-art machine learning and explainability methods. The findings offer several key contributions. Methodologically, we demonstrated a rigorous approach to quantify not only the presence of emotions during ads but also their temporal patterns—introducing features like emotional variability, slopes, and timing of peaks. We showed that these dynamic features can be successfully integrated into predictive models (exemplified by a tuned XGBoost classifier) to forecast which ads will be remembered or rated favorably. Our use of SHAP explanations further provided a blueprint for how to open the "black box" of such models, allowing marketing analysts to trace predictions back to intuitive emotional signals. Substantively, the study's results highlight that moment-to-moment emotional expressions play a pivotal role in an ad's impact. Ads that elicited a strongly positive and engaging emotional trajectory—especially those that built up to a peak of joy—were considerably more likely to be recalled by viewers. This underscores a practical implication for advertisers: crafting an emotional storyline with highs can enhance an advertisement's memorability. It's not only the overall sentiment of an ad that matters, but how that sentiment evolves and culminates. For academic researchers, these findings enrich advertising theory by empirically confirming that dynamic affective responses are as important as static content factors in driving outcomes like recall, thus bridging a gap between psychological theories of emotion dynamics and applied advertising research.

Despite its contributions, this study is not without limitations. We examined a specific collection of ads and a relatively small sample of viewers, which may constrain the generalizability of the absolute performance of our model. The predictive accuracy we achieved (AUC in the 0.7-0.8 range for most tasks) is respectable but also indicates that facial expressions capture only one facet of effectiveness—future work should consider complementary data for a more holistic prediction. Additionally, the facial coding technology, while advanced, may misinterpret certain expressions, and thus some emotional nuance could have been lost in our features. These limitations point to future research directions. Expanding the sample to include diverse demographics and ad types would test the robustness of our findings across contexts. Integrating other behavioral or neural measures could improve predictions and offer deeper insight into the mechanisms. Another promising direction is to apply our analytic framework in real marketing settings—for instance, using emotional dynamics to predict ad campaign success in-market, or to personalize ad delivery. Finally, research might explore interventions: can we systematically increase an ad's effectiveness by editing its emotional arc, and do the models correctly forecast the improvement? Addressing these questions would further validate and extend the practical utility of emotional dynamics.

In conclusion, this study provides evidence that "how we feel, moment by moment, as we watch an ad" profoundly shapes what we take away from it. Emotional expressions are more than a reaction; they are part of the advertising process that can amplify or dampen an ad's resonance. By capturing these transient dynamics and linking them to outcomes, we move towards a more emotionally intelligent form of advertising evaluation. Marketers armed with these insights can design content that not only evokes emotion but does so in the right pattern—aiming for that impactful crescendo that leaves viewers with a lasting impression.

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The Impact of Fiscal Decentralization on SME activity in Kazakhstan: Regional Level Analysis

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Abstract

This paper examines the impact of Kazakhstan's 2020 corporate income tax (CIT) reform, which reassigned SME-related CIT revenues to regional budgets, on SME performance over the period 2017–2023. Using oblast-level panel data and fixed-effects models, the analysis finds that the reform was associated with selective but economically meaningful improvements in SME outcomes, particularly in employment and output. Short-term effects are most evident among small enterprises and agricultural SMEs, while medium-term results point to sustained output expansion among individual entrepreneurs and medium-sized firms In contrast, the effects on SME registration and gross value added vary by firm type and over time. Overall, the findings suggest that fiscal decentralization strengthened local incentives to support SME expansion primarily through intensive-margin growth, rather than broad-based firm entry or persistent productivity gains. The results highlight the role of subnational fiscal incentives in shaping regional business activity and underscore the importance of complementary policies to translate fiscal decentralization into sustained and inclusive economic development.

Keywords: fiscal decentralization, SME development, regional budgets, corporate income tax reform, local government.

Introduction

Fiscal decentralization—delegation of budgetary autonomy from central government to regional subnational institutions—is theoretically built upon the premise of improved allocative efficiency, enhanced government structure and local accountability and responsiveness (Oates, 1972). Many studies have found that fiscal decentralization promotes responsiveness and accountability of local government by enabling them to customize public goods and services to the local needs (Garello 2003; Faguet, 2004; Bahl and Linn, 2014). Furthermore, decentralization can improve local revenue performance, since local governments will have more autonomy to better establish tax policies and enforcement tactics since local governments gain greater discretion over fiscal management and enforcement, potentially improving revenue performance and accountability (Din et al., 2022).

However, despite these strong theoretical justifications, the literature on the impact of fiscal decentralization on economic development is inconclusive (Martinez-Vazquez & McNab, 2003). This can be partly explained by the complexity of studying fiscal decentralization, as it intersects with political, economic, social and legal factors creating contextual peculiarities of each country, which in turn result in contradicting outcomes (Garello 2003; Martinez-Vazquez and McNab, 2003). Especially, there is a noticeable lack of empirical studies addressing the impact of fiscal decentralization within the context of transitional economies like Kazakhstan (Amagoh, 2022). This gap is particularly significant, as SMEs play an important role in Kazakhstan's economic growth by generating employment and fostering a more diversified economic structure, while also relying heavily on local government support and regulation (OECD, 2018; Bureau of National Statistics, 2025).

Kazakhstan, as a post-Soviet country, has inherited a highly centralized institutional system (Amagoh, 2022). The central government traditionally retained authority over major tax revenues and the allocation of public goods (World Bank, 2023). The first attempts of decentralization was adopted by the law "On Local Representative and Executive Bodies of the Republic of Kazakhstan" (1993), which created regional, city and district maslikhats (councils) elected by respective local population. Another important move for fiscal decentralization was implementation of Budget Code of the Republic of Kazakhstan (2008) and the "Law on Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on the Issues of Delimitation of Powers between Levels of Government" (2006).

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This Code established a formal structure of intergovernmental fiscal relations and a multi-tier budget system: Republican budget, regional budget (oblast, cities of republican significance, capital city), district budget (includes cities of regional significance). According to this Code, regional budgets are a centralized financial resource served for the local government bodies at the regional level, and finally approved by the maslikhat. Similarly, the district budget is allocated for the functions and mandates of local bodies at the district level. Later, the fourth-level budget was later introduced in Law on the Development of Local Government (2018) and is applied to the smallest administrative units, such as rural areas and villages.

The 2020 amendment to Kazakhstan's Budget Code (Law No. 382-VI ZRK, Dec 10 2019) restructured the allocation of CIT from SMEs. Under the reform, CIT revenues from SMEs were directed straight to regional budgets, while taxes from large enterprises and the oil sector remained centralized. This change enhanced local governments' fiscal autonomy, allowing them to use SME-related CIT revenues to finance regional development, public services, and infrastructure projects. The reform also introduced flexibility for differentiating how revenues are distributed across oblast (region), raion (district), and okrug (subdistrict) levels. Therefore, this paper aims at empirically analyzing the impact of fiscal decentralization to the measurable SME activities using regional level analysis.

According to the World Bank data (2023), corporate income tax (CIT) has been a large contributor to the national revenue, reaching up to 30 % of total tax revenue within 2005 to 2021. At the same time, the World Bank (2023) highlighted a clear fiscal mismatch between revenue centralization and expenditure responsibilities at the subnational level, where regional governments remain responsible for economic development and service provision despite limited control over major revenue sources. Therefore, the latest reform on shifting CIT revenue from republican budget to regional budget is considered to be a significant movement towards fiscal decentralization. Because regional governments will be responsible both on how they generate revenue as well as how to spend these funds, consequently, regions are believed to be encouraged to better and actively promote entrepreneurship activities.

International practice also highlights the importance of sharing national tax revenue to regional subnational bodies so that they can effectively match expenditures and revenue sources taking into account geographical, social, demographic and economic differences (World Bank, 2023). Regarding the rate of CIT, it has also experienced fluctuations due to different political and economic reforms. The highest CIT rate was reaching almost around 30 % in 2006, which was later significantly decreased to 20 % in 2009 (Tax Committee of the Ministry of Finance, 2025). Currently, the tax rate remains at 20 % (Baker McKenzie, 2025).

This study contributes to the existing literature on fiscal decentralization by focusing on a policy area that has received relatively limited empirical attention: the relationship between revenue decentralization and SME activity in a transition economy. Using Kazakhstan's 2020 reform that reassigned SME-related corporate income tax revenues to regional budgets, the paper provides empirical evidence on how SME registration, employment, output, and gross value added evolved before and after the reform. The analysis relies on regional panel data and distinguishes between short- and medium-term effects across different types of SMEs, including small enterprises, individual entrepreneurs, and agricultural firms. Overall, the findings offer context-specific insights into how fiscal decentralization shapes SME activity in Kazakhstan and may be relevant for understanding similar dynamics in other transition economies.

Literature review

The main theoretical framework of fiscal decentralization is built upon Oates (1972) work Decentralization Theorem, which highlights its positive impact on the effectiveness of regional governments meeting the needs of local residents (Oates, 1972; Tiebout, 1956). Consequently, as the facilitator of economic development through effective utilization of public goods, decentralisation can lead to the creation of a favourable environment for businesses (Enikolopov and Zhuravskaya, 2007; Hanif et al., 2020).

The literature emphasizes the link between fiscal decentralization and entrepreneurial activities, stemming from having more discretion over spending and taxes and active involvement of local government officials in promoting regional economic activity. This is especially applicable for SMEs, which in turn are extensively affected by the regulatory and fiscal settings (Akai and Sakata, 2002). Study on federal developing countries further supports highlighting positive effects of fiscal decentralization on firm entry and SME performance (Hanif et al., 2020). Empirical studies in Latin America (Smith, 2010), Zambia (Likando et al., 2023) and Russia (Bukharsky, 2020) found that higher fiscal decentralization led to the "pro-SME" outlook providing financial support, trainings, and simpler tax regulations to support firm creation and growth. In addition to that, Escaleras and Chiang (2017) claim that fiscal decentralization creates a business-friendly

climate especially in developing countries. One explanation for this can be that subnational governments with more autonomy can easily identify and address the challenges SMEs face.

However, the effectiveness of fiscal decentralization depends critically on institutional design and governance quality. Evidence from developing countries suggests that weak accountability mechanisms may lead to opportunistic behavior and misuse of fiscal autonomy at the local level (Din et al., 2022). In this context, successful fiscal decentralization is strongly influenced by institutional design, especially in highly centralized governments. Poor institutional design lead to the two major problems: vertical fiscal imbalance—when subnational government have expenditure responsibility, but does not have autonomy over local revenue—and soft budget constraints, reliance on intergovernmental transfers (Rodríguez-Pose and Vidal-Bover, 2024; Weingast, 2009).

Therefore, delegating local revenue autonomy is crucial for effective fiscal decentralization and strengthening local accountability (Rodden, 2003; Asatryan et al., 2015). Government officials who are responsible for the expenditure and the revenue generation independently, are motivated to promote SMEs, and hence enlarge the tax base (Jia et al., 2023). In this sense, revenue decentralization has more impact on effective expenditure and higher accountability compared to only expenditure decentralization (Canavire-Bacarreza et al., 2020).

This is further supported by Bukharsky and Lavrov's (2020) findings, which indicate that in Russian cities with low tax autonomy, fiscal decentralization did not facilitate the development of SMEs. Similarly, in some cases fiscal decentralization can have adverse effects on SMEs. For example, according to Song et al. (2022) in China fiscal decentralization impeded planned reallocation of industry, although there was a positive impact on SME innovation. Sometimes, increased fiscal decentralization can worsen regional inequality (Martinez- Vazquez et al. 2017) or positive effects can sometimes be the compensation of poor institutional structure (Escaleras and Chiang, 2017).

Overall, studies on fiscal decentralization and SME development have divergent outcomes, posing different challenges and nuances. In this sense, Kazakhstan's case is a good example to evaluate the causal relationship between fiscal decentralization and SME growth in light of the recent CIT reform.

Data and Methodology

Data description

We constructed a panel dataset at oblast (region) level from 2017 through 2023 on SME and other related indicators from publicly available sources posted by the Bureau of National Statistics of Kazakhstan. In particular, to measure SME activity, we use data on the number of SMEs registered, number of people employed by SMEs, SME output (in millions KZT) and SME Gross Value Added (in millions KZT). For each indicator, we have data by type of SME, particularly small (an average annual number of employees not more than 100, and average annual revenue of no more than 300,000 times the monthly calculation index), medium (between 100 and 250 employees), individual entrepreneurs and agricultural SMEs.

Based on the methodology of the Bureau of National Statistics, the variables for SME output and Gross Value Added (GVA) are essential metrics for evaluating the sector's contribution to the national economy. SME Output represents the total volume of goods produced, work performed, and services rendered by resident SME entities—including legal entities, individual entrepreneurs, and farm enterprises—valued at current prices. Gross Value Added (GVA) serves as the balancing item in the production account and is defined as the difference between total output and the costs of intermediate consumption. While the output figure reflects the total scale of business activity, GVA represents the actual economic value created by the SME sector after accounting for production expenses. Definitions and measurement of SME indicators follow the official statistical methodology of the Bureau of National Statistics of the Republic of Kazakhstan (Bureau of National Statistics, 2017).

We also constructed data related to indicators that determine SME activity, in particular Gross Regional Product per capita, population density, unemployment rate and urbanization rate. For example, a study on European firm-level panel data found a strong positive correlation between regional income level and SME performance (Doucet, Requejo, & Suárez-González, 2024). These indicators are also widely used in regional SME analyses and are identified as important contextual determinants of SME patterns across European regions (ESPON, 2017). Similarly, findings from Russia (EIB, 2020) and Kazakhstan (OECD, 2018) confirms that in regions with high GRP, SMEs tend to have higher revenue (EIB, 2020). Furthermore, high unemployment rate can create challenges for small firm expansion (O'Leary, 2022), although there is a possibility to attract more workers at a lower cost (Gupta, 2024).

Summary statistics of our main variables are presented in Table 1. The summary statistics show substantial variation in SME activity across regions. On average, there are about 102,000 registered SMEs, with the majority consisting of individual entrepreneurs (around 65,000) and small enterprises (about 23,900), while medium firms are relatively few (a mean of 172). SME employment averages 213,000 workers, heavily concentrated in small and individual enterprises, suggesting that Kazakhstan's SME sector is dominated by micro- and small-scale operations. SME output averages about 2.4 trillion KZT, with small enterprises generating the largest share, followed by individual entrepreneurs and medium firms. Similarly, gross value added (GVA) averages 1.9 trillion KZT, again with small firms as the main contributors, reflecting their dominance in overall SME economic activity.

Table 1. Summary statistics

Variable	Mean	Std. Dev.	Minimum	Maximum
SME # of Registered	102066	68628	34251	381950
Small	23904	29690	7278	137587
Medium	172	189	44	970
Indiv. Entrepr.	65151	39069	21653	240312
Agriculture	12839	17595	124	81527
SME Employment	213204	154563	85610	969528
Small	89922	99158	26592	573525
Medium	21564	14481	6558	79153
Indiv. Entrepr.	84643	46350	37308	313242
Agriculture	17075	21236	117	93107
SME Output (mlns)	2402525	3039528	325868	20000000
Small	1672652	2412349	195730	15400000
Medium	435941	504967	59816	3151960
Indiv. Entrepr.	181693	189256	31329	1453940
Agriculture	112239	111959	0	448931
SME Gross Value Added (mlns)	1903310	2485072	244876	16800000
Small	1596097	2120955	201365	14500000
Medium	307213	368472	43511	2307699
GRP Per Capita (thousand KZT)	4201	3086	819	19974
Population Density (per sq. m.)	319,7	762,4	2,8	3169,9
Unemployment Rate (%)	48,3 %	1,8 %	0,410	0,530
Urbanization Rate (%)	61,3 %	23,4 %	0,130	1,000

Regional economic and demographic indicators also exhibit wide disparities. Gross regional product (GRP) per capita averages about 4.2 million KZT, with a range from under 1 million to nearly 20 million, indicating significant regional inequality. Population density varies sharply—from sparsely populated areas (as low as 2.8 people per square meter) to densely populated ones exceeding 3,000. The unemployment rate averages 4.8 %, showing moderate variation across regions, while urbanization rates average around 61 %, ranging from 13 % to full urbanization in cities like Almaty, Astana and Shymkent with a status of a city of regional significance. These figures highlight considerable heterogeneity in economic structure and spatial development across Kazakhstan's regions, which may influence SME performance and local fiscal capacity.

Empirical methodology

We estimate the association between the 2020 CIT allocation reform and regional SME activity using panel regressions at the oblast–year level. Let Y_{it} denote one of four outcomes for oblast i in year t: number of registered SMEs ($SMEReg$), SME employment ($SMEEmp$), SME output in million KZT ($SMEOut_{mln}$), and SME gross value added in million KZT ($SMEGVA_{mln}$). Our baseline specification is

$$Y_{it} = \alpha + \beta\, PostReform_t + \gamma_1 GRPpc_{it} + \gamma_2 PopDensity_{it} + \gamma_3 UnempRate_{it} + \gamma_4 UrbanRate_{it} + \mu_i + \varepsilon_{it}, \quad (1)$$

where $PostReform_t = 1$ in 2020–2023 and 0 in 2017–2019; μ_i are oblast fixed effects; and ε_{it} is an idiosyncratic error term. Standard errors are clustered at the oblast level to allow arbitrary serial correlation and heteroskedasticity within oblasts. The vector of controls includes gross regional product per capita ($GRPpc_{it}$), population density ($PopDensity_{it}$), unemployment rate ($UnempRate_{it}$), and urbanization rate ($UrbanRate_{it}$). The coefficient β captures the average post-reform level change in the outcome relative to 2017–2019, conditional on controls and time-invariant oblast characteristics. Variance inflation factors

(VIFs) computed for the time-varying regressors indicate low collinearity, with all VIF values well below conventional thresholds.[1]

Fixed-effects (FE) panel models are well suited for evaluating policy reforms when unobserved heterogeneity across regions is likely to be correlated with both policy exposure and outcomes. In our context, oblasts differ persistently in institutional quality, industrial structure, geographic characteristics, historical entrepreneurial culture, and administrative capacity—factors that jointly influence SME performance and are unlikely to be fully captured by observable covariates. The inclusion of oblast fixed effects absorbs these time-invariant characteristics, ensuring that identification relies on within-oblast variation over time rather than cross-sectional differences. Consequently, the estimated reform coefficient reflects deviations from an oblast's own pre-reform trajectory, conditional on observable time-varying controls.

Given the nationwide nature of the 2020 CIT allocation reform, causal interpretation relies on the assumption that, absent the reform, SME outcomes would have followed similar within-region trends as observed in the pre-reform period. This identifying assumption is assessed empirically through pre-trend diagnostics and robustness checks incorporating region-specific time trends and alternative post-reform windows. While the absence of an untreated control group precludes a difference-in-differences design, the FE framework remains appropriate for isolating policy-induced changes relative to historical regional baselines, a strategy commonly adopted in evaluations of national fiscal reforms.

To distinguish short- and medium-run effects, we estimate the equation 1 with variants of $PostReform_t$ indicators. Particularly, where $PostReformShort_t = 1$ for 2020–2021 and 0 for 2017–2019, and $PostReformMedium_t = 1$ for 2022–2023 and 0 for 2017–2019. The base period is therefore 2017–2019.

We include oblast fixed effects μ_i to absorb time-invariant differences across regions (e.g., business climate, geography, long-run industrial structure).

We do not include year fixed effects because the reform indicator is national and perfectly collinear with a full set of year dummies; including them would mechanically difference out $PostReform_t$, $PostReformShort_t$, and $PostReformMedium_t$. Clustering at the oblast level addresses within-oblast serial correlation in shocks to SME activity. We assess the validity of the identifying assumption using an event-study framework with 2019 as the reference year. Joint tests of pre-reform coefficients for 2017 and 2018 fail to reject the null of zero effects across all SME outcomes, including total registered, gross value added, output, and employment (p-values range from 0.31 to 0.80). This indicates no evidence of differential pre-trends across oblasts prior to the 2020 reform and supports the fixed-effects specification as an appropriate baseline.

Results

First we present a descriptive analysis of SME activity before and after the CIT decentralization reform, then we present our main empirical analysis results.

Descriptive analysis

Figure 1 shows large variation in regional fiscal capacity and dependence on central transfers across Kazakhstan. Richer and more urbanized areas—such as Almaty city, Astana city, and Atyrau oblast—generate the highest total revenues (above 1 trillion KZT) and exhibit minimal transfer dependence (below 10 %). In contrast, poorer and more rural oblasts—including Turkistan, Zhambyl, and Kyzylorda—display high reliance on intergovernmental transfers, exceeding 70–80 %. This pattern reflects the persistence of regional inequality in revenue-raising capacity and underscores the rationale for fiscal decentralization reforms such as the 2020 CIT allocation change.

[1] When oblast fixed effects are included, VIF statistics mechanically increase because fixed effects are highly correlated with slow-moving regional characteristics such as urbanization and population density. This behavior is well known in fixed-effects models and does not indicate estimation problems, as fixed effects are nuisance parameters that absorb time-invariant heterogeneity.

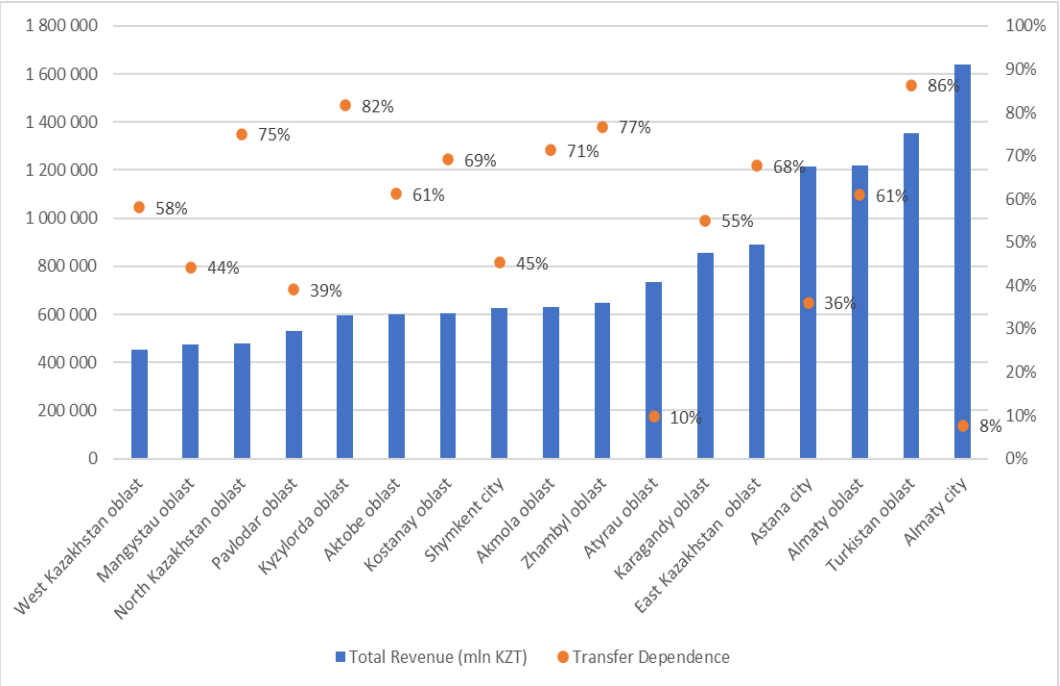

Figure 1. Total revenue and transfer dependency by oblast, 2023

Figure 2 shows CIT collections from SMEs rose markedly following the 2020 Budget Code amendment that assigned these revenues directly to regional budgets. Prior to the reform, annual SME CIT revenue increased gradually from 21 billion KZT (2017) to 28 billion KZT (2019). After the reform, revenue growth accelerated sharply reaching 43 billion KZT in 2021, 61 billion KZT in 2022, and 68 billion KZT in 2023. The post-2020 expansion indicates stronger compliance and regional collection incentives once local governments gained authority over SME-related CIT proceeds.

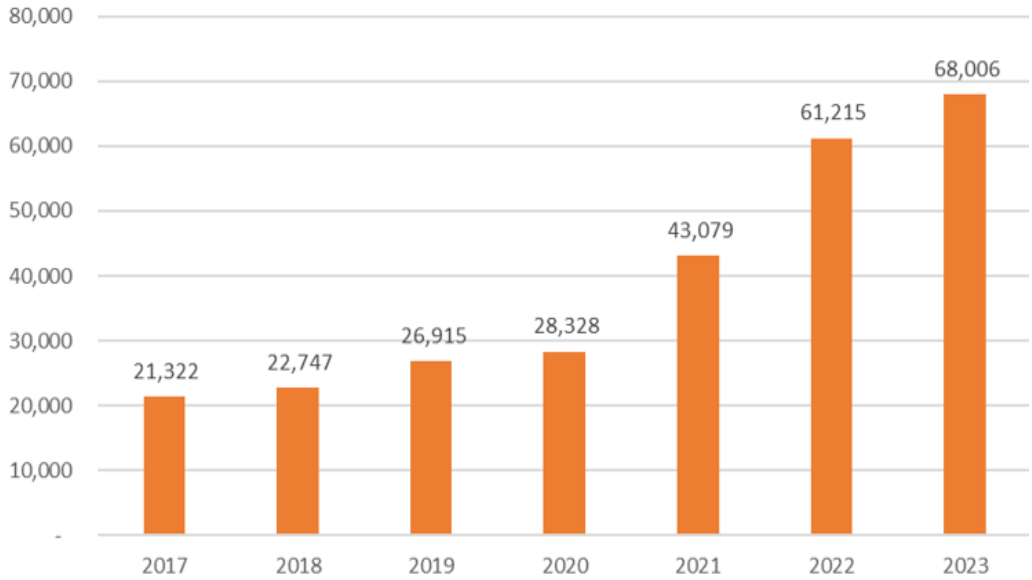

Figure 2. CIT SME Tax revenue by year

As for SME activity indicators, Figure 3 shows the number of registered SMEs remained relatively stable before 2020 but expanded steadily thereafter. Between 2017 and 2019, SME registrations hovered around 90–95,000; following the reform, the total rose to over 120,000 by 2023. Individual entrepreneurs constitute the largest segment, while small enterprises represent the main formal business group. The noticeable post-2020 increase suggests improved business formalization and local-level policy attention to SME development, coinciding with the reform's decentralization of SME CIT revenue.

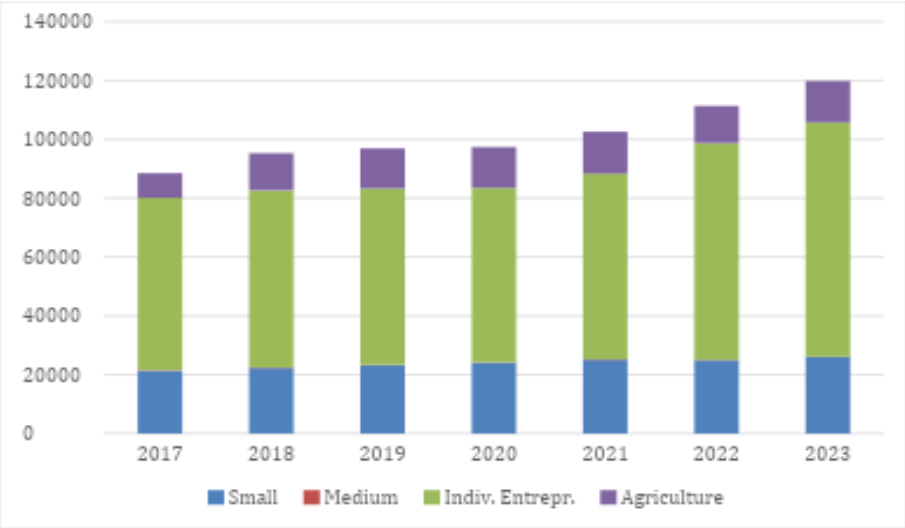

Figure 3. Number of Registered SMEs by type and year

SME employment exhibits a similar pattern in Figure 4. Before 2020, total SME jobs were relatively constant at 180–200,000; after the reform, employment rose steadily to nearly 250,000 by 2023. Most new jobs emerged in small enterprises and individual entrepreneur segments, indicating that the decentralization of SME tax revenue may have indirectly stimulated local employment growth through targeted regional support programs.

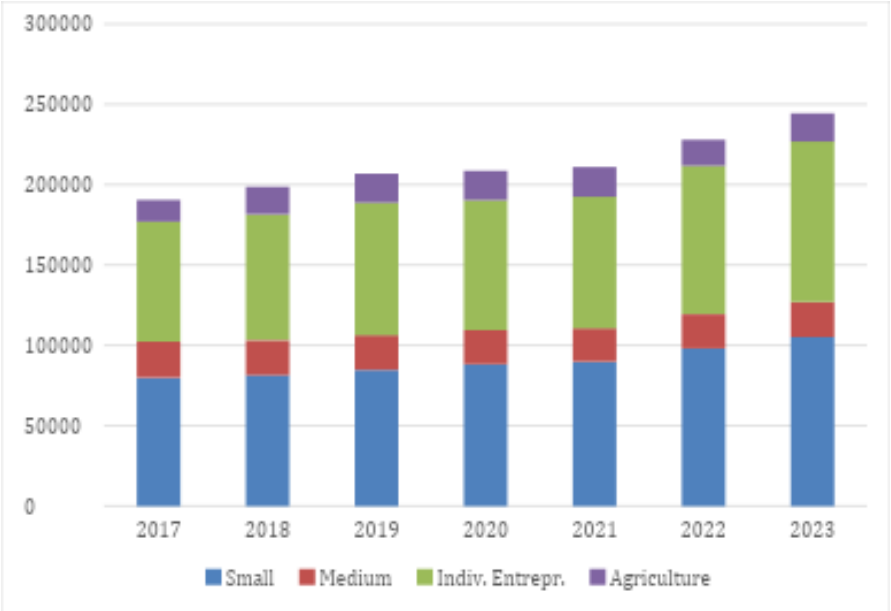

Figure 4. SME Employment by type and year

SME output expanded significantly over the period as shown in Figure 5. Output increased from roughly 1.4 trillion KZT in 2017 to 2.8 trillion KZT in 2020, and more than doubled to over 4 trillion KZT by 2023. The post-reform surge was driven largely by small enterprises, while medium firms and individual entrepreneurs also contributed. The acceleration after 2020 is consistent with improved SME productivity and access to local development initiatives financed by CIT revenues retained at the regional level.

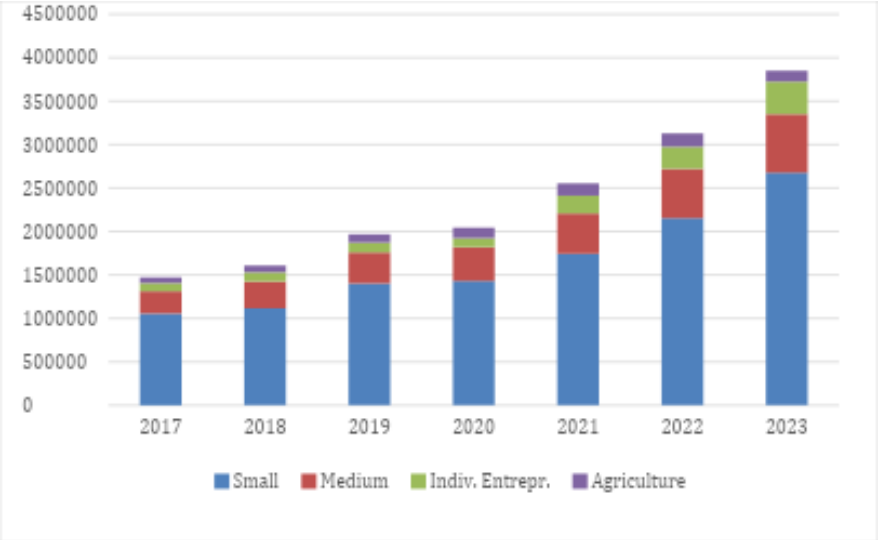

Figure 5. SME Output by type and year

As shown in Figure 6, SME gross value added (GVA) followed a similar growth trajectory, more than doubling from about 1.1 trillion KZT in 2017 to nearly 3 trillion KZT in 2023. Both small and medium enterprises experienced notable gains after 2020, reflecting rising efficiency and profitability within the sector. The timing of the increase aligns with the post-reform period, suggesting that allowing regions to retain SME CIT revenue may have enhanced local business environments and encouraged reinvestment.

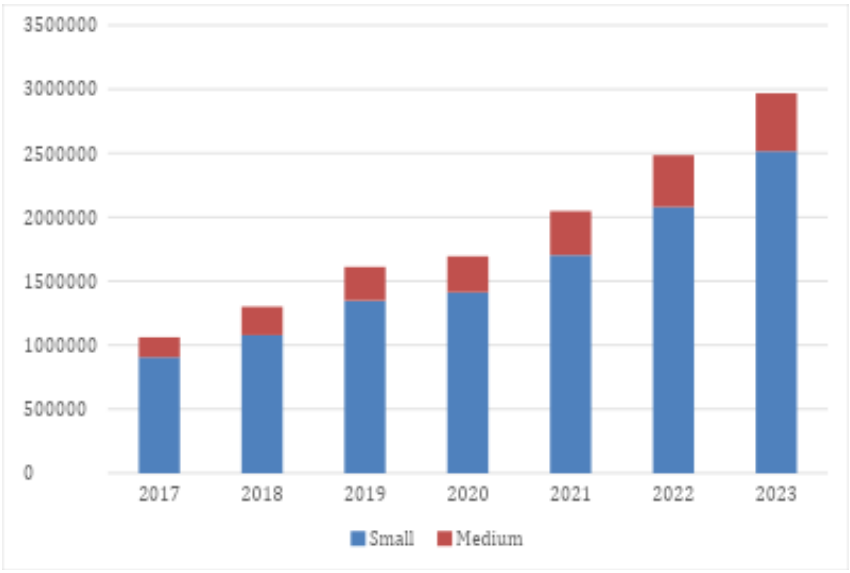

Figure 6. SME Gross Value Added by type and year

Overall, the descriptive analysis highlights a clear upward trajectory in SME activity and regional fiscal performance following the 2020 corporate income tax (CIT) reform. Prior to the reform (2017–2019), both SME indicators and SME CIT collections showed only modest growth, reflecting limited local fiscal incentives. After 2020, when SME CIT revenues were reassigned directly to regional budgets, SME tax collections and economic outcomes accelerated markedly.

Figures 2 through 6 collectively show substantial post-reform increases in SME registration, employment, output, and gross value added, with the strongest gains in small enterprises and individual entrepreneurs. At the same time, Figure 1 reveals wide disparities in revenue capacity and transfer dependence across oblasts—urban and resource-rich regions such as Almaty and Astana cities remain largely self-financed, while southern and western oblasts continue to rely heavily on central transfers. Taken together, the descriptive patterns suggest that the CIT decentralization reform may have strengthened local government incentives, enhanced SME dynamism, and contributed to more regionally grounded economic development after 2020.

Empirical analysis

Next, we present the results of our empirical analysis. We start with a more generic fixed effect estimation of the CIT reform on SME indicators while controlling for GRP per capita, population density, unemployment rate and urbanization rate.

The fixed-effects estimates in Table 2 indicate a positive and statistically significant association between the 2020 CIT reform and key dimensions of SME activity, particularly employment and output. Following the reform, SME employment increased by approximately 349,000 workers on average, while SME output rose by about 414 billion KZT, both statistically significant at conventional levels. In contrast, the estimated effect on the number of registered SMEs is positive but not statistically significant, and the coefficient on SME gross value added is also imprecisely estimated. Taken together, these results suggest that the decentralization of SME-related CIT revenues was associated primarily with intensive-margin adjustments—expansion of activity and scale among existing firms—rather than a statistically discernible increase in firm entry or aggregate value added over the sample period. The findings are consistent with the interpretation that enhanced local fiscal incentives strengthened subnational governments' motivation to support SME expansion, particularly through employment growth and higher production levels after 2020.

Table 2. The impact of the reform on SME indicators

	(1)	(2)	(3)	(4)
VARIABLES	SME # of Registered	SME Employment	SME Output	SME Gross Value Added
Post Reform	2,822	348,670**	414,377**	3,703
	(2,395)	(149,208)	(168,199)	(4,823)
Gross Regional Product Per Capita	-1.432	1.066	-16.15	-2.394
	(1.088)	(52.98)	(78.39)	(2.036)
Population Density	207.7***	13,109***	16,399***	484.3***
	(16.50)	(1,792)	(1,463)	(54.81)
Unemployment Rate	96,856	-2.027e+07*	-2.387e+07*	-170,175
	(193,748)	(1.098e+07)	(1.157e+07)	(463,339)
Urbanization Rate	16,125	7.888e+06**	1.196e+07***	-5,394
	(115,368)	(2.867e+06)	(3.616e+06)	(208,207)
Constant	-16,613	2.452e+06	1.179e+06	151,709
	(91,092)	(5.809e+06)	(6.206e+06)	(214,343)
Observations	113	113	113	113
R-squared	0.437	0.843	0.851	0.664
Number of oblasts	17	17	17	17
Within R-squared	0.437	0.843	0.851	0.664

Notes: Robust standard errors clustered at oblast level are in parentheses. Stars indicate statistical significance (*** p<0.01, ** p<0.05, * p<0.1)

The estimated coefficients on the control variables are broadly consistent with insights from the regional development literature. Population density exhibits a strong and statistically significant positive association with all SME outcomes, underscoring the importance of agglomeration effects, market access, and scale economies for SME development. Urbanization is positively and significantly associated with SME employment and output, suggesting that more urbanized regions provide a more conducive environment for SME expansion through better infrastructure, labor markets, and business services. By contrast, higher unemployment rates are associated with weaker SME performance in employment and output, reflecting subdued labor demand and weaker regional economic conditions. Gross regional product per capita does not exhibit a statistically significant association with SME registration or employment once oblast fixed effects are included, indicating that much of the cross-regional income variation is absorbed by time-invariant regional characteristics. Overall, the control estimates confirm that SME activity is more pronounced in denser and more urbanized regions, while the post-reform coefficients highlight the role of fiscal decentralization in reinforcing these structural advantages rather than reshaping regional fundamentals in the short run.

For our main specification, we estimate both short- and medium-term impact of the reform. We discuss the results for each of SME activity indicators separately in Table 3 through 6.

The short-term results in Table 3 show a selective but positive response of SME registration to the 2020 CIT reform, concentrated primarily among small enterprises and agricultural SMEs. In the immediate post-reform period (2020-2021), the number of small enterprises increased by about 885 on average, a statistically

significant effect, while agricultural SMEs rose by approximately 2,800, also statistically significant. The estimated increase in individual entrepreneurs is positive but not statistically significant, and medium-sized enterprises show no discernible short-term response. These patterns suggest that the decentralization of SME CIT revenues translated relatively quickly into higher registration among firm categories that are more sensitive to local administrative incentives and support mechanisms, while larger SMEs exhibited little immediate adjustment. Overall, the short-term evidence points to an early but uneven expansion in SME registration following the initial implementation of the reform.

Table 3. The impact of the reform on SMEs registered in short and medium term

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Small	Medium	Entrepr.	Agric.	Small	Medium	Entrepr.	Agric.
Post Reform (short)	884.7**	-6.626	436.9	2,807**				
	(363.5)	(6.391)	(1,347)	(1,212)				
Post Reform (medium)					1,654	20.83*	9,554*	-2,290
					(1,147)	(9.917)	(4,829)	(5,203)
GRP per capita	0.313	0.00468	-0.0651	0.130	-0.165	-0.00116	-1.407	-0.149
	(0.214)	(0.00294)	(0.479)	(0.330)	(0.142)	(0.00143)	(0.874)	(0.237)
Population Density	48.91***	-0.262***	49.26***	-11.97*	50.86***	-0.123***	136.2***	8.385
	(10.44)	(0.0852)	(15.40)	(6.760)	(8.306)	(0.0289)	(13.79)	(11.27)
Unemployment Rate	-13,129	662.9	-47,247	-117,496*	48,235	603.4**	115,313	-40,115
	(17,845)	(468.9)	(75,285)	(64,898)	(29,430)	(242.7)	(124,825)	(51,767)
Urbanization Rate	-10,231	-385.5*	44,767	196,671	-25,038	-358.3	-87,782	-14,822
	(25,068)	(216.0)	(133,644)	(148,093)	(25,966)	(227.3)	(79,451)	(91,810)
Oblast FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	19,093	151.5	40,655	-48,803	-332.7	137.4	23,627	39,639
	(17,468)	(245.0)	(79,531)	(72,188)	(19,818)	(142.3)	(61,719)	(53,092)
Observations	79	79	79	79	81	81	81	81
R-squared	0.833	0.352	0.155	0.083	0.878	0.360	0.715	0.027
# of oblasts	16	16	16	16	17	17	17	17
Within R-sq	0.833	0.352	0.155	0.0829	0.878	0.360	0.715	0.0266
Notes: Robust standard errors clustered at oblast level are in parentheses. Stars indicate statistical significance (*** p<0.01, ** p<0.05, * p<0.1)								

The medium-term estimates (2022-2023) indicate that the reform's effects became more pronounced for selected SME categories, particularly individual entrepreneurs. Over this period, the number of registered individual entrepreneurs increased by approximately 9,554, a statistically significant effect, pointing to a delayed but substantial expansion in micro-entrepreneurial activity. Medium-sized enterprises also begin to show a small but statistically significant increase of about 21 units, suggesting a gradual response as regional fiscal and administrative practices adjusted to the new revenue incentives. In contrast, the estimated effect for small enterprises, while positive, is not statistically significant in the medium term, and agricultural SMEs do not exhibit a robust medium-term response, possibly reflecting persistent structural constraints in rural business formation. Taken together, the medium-term findings suggest that the CIT reform's impact on SME registration shifted over time toward individual entrepreneurs and, to a lesser extent, medium-sized firms, consistent with a gradual reallocation of local policy attention and support following fiscal decentralization.

The short-term results in Table 4 indicate a selective employment response to the 2020 CIT reform, concentrated primarily among small enterprises. In the immediate post-reform period (2020-2021), employment in small enterprises increased by approximately 4,269 workers on average, a statistically significant effect. In contrast, the estimated employment changes for individual entrepreneurs and agricultural SMEs, while positive in sign, are not statistically significant, and medium-sized enterprises show no measurable short-term employment response. These findings suggest that the initial employment gains following the reform were driven mainly by small firms, which are typically more responsive to localized policy support and administrative facilitation. Overall, the short-term evidence points to an early but narrowly concentrated employment expansion, rather than a broad-based increase across all SME categories.

Table 4. The impact of the reform on SME employment in short and medium term

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Small	Medium	Entrepr.	Agri.	Small	Medium	Entrepr.	Agri.
Post Reform (short)	4,269**	-399.8	2,212	2,219				
	(1,478)	(689.3)	(1,691)	(1,483)				
Post Reform (medium)					2,094	1,171	6,081	-3,164
					(3,893)	(1,060)	(5,796)	(5,932)
GRP Per Capita	1.034	-0.165	0.673	0.204	-0.696	-0.202	-1.253	-0.199
	(0.847)	(0.264)	(0.694)	(0.352)	(0.858)	(0.170)	(1.032)	(0.294)
Population Density	119.2***	-6.079	29.17	-9.217	300.0***	6.851	172.7***	12.28
	(17.20)	(8.249)	(45.89)	(8.076)	(36.20)	(4.409)	(26.83)	(12.79)
Unemployment Rate	-128,322*	-13,802	-138,587	-81,083	-173,951	9,344	65,492	-6,890
	(72,775)	(37,066)	(83,716)	(72,525)	(156,225)	(32,324)	(172,472)	(64,329)
Urbanization Rate	-92,283	-46,961	81,643	207,722	61,327	-36,285*	4,575	-51,210
	(125,773)	(55,174)	(146,808)	(175,670)	(79,216)	(20,358)	(94,448)	(122,374)
Oblast FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	160,592**	59,664	84,129	-69,522	43,864	37,633*	-264.3	49,412
	(63,415)	(41,756)	(98,803)	(86,290)	(83,868)	(19,549)	(79,128)	(73,066)
Observations	79	79	79	79	81	81	81	81
R-squared	0.693	0.085	0.144	0.056	0.911	0.145	0.713	0.051
# of oblasts	16	16	16	16	17	17	17	17
Within R-sq	0.693	0.0846	0.144	0.0557	0.911	0.145	0.713	0.0508
Notes: Robust standard errors clustered at oblast level are in parentheses. Stars indicate statistical significance (*** p<0.01, ** p<0.05, * p<0.1)								

The medium-term estimates (2022-2023) suggest that the employment effects of the reform did not broaden substantially across firm types. Although the coefficients for small enterprises, medium enterprises, and individual entrepreneurs are positive in the medium term, none of these estimates are statistically significant, indicating that employment growth did not persist in a robust or systematic manner beyond the initial post-reform period. Agricultural SMEs also show no significant medium-term employment response. Taken together, these results imply that while the decentralization of SME-related CIT revenues was associated with a short-term employment increase among small enterprises, the reform did not generate sustained or widespread employment growth across SME categories in the medium term. This pattern is consistent with an initial adjustment phase following the reform, after which employment dynamics appear to be driven more by underlying regional economic conditions than by continued fiscal decentralization effects.

The short-term estimates in Tables 5 and 6 indicate that the 2020 CIT reform was associated with immediate but heterogeneous effects on SME output and value creation across firm types. In the initial post-reform period (2020-2021), SME output increased significantly among medium enterprises, by about 54 billion KZT on average, as well as among individual entrepreneurs (approximately 25.6 billion KZT) and agricultural SMEs (around 57.3 billion KZT). By contrast, the estimated short-term effect for small enterprises' output is not statistically significant, suggesting that early production responses were concentrated in specific segments rather than uniformly across the SME sector. These patterns are consistent with the interpretation that the initial decentralization of SME-related CIT revenues facilitated faster expansion among firm types that were able to adjust production relatively quickly.

Table 5. The impact of the reform on SME output in short and medium term

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Small	Medium	Entrepr.	Agri.	Small	Medium	Entrepr.	Agri.
Post Ref. (short)	-1,628	54,196*	25,583**	57,262***				
	(89,581)	(25,969)	(10,040)	(15,129)				
Post Ref. (medium)					360,128	205,769*	117,280***	34,988
					(276,871)	(108,184)	(20,875)	(20,351)
GRP Per Capita	261.9***	43.86***	16.12*	8.991	-20.63	-7.452	-18.44**	4.622
	(39.13)	(9.026)	(8.203)	(10.10)	(60.84)	(7.583)	(7.370)	(3.609)
Population Density	8,550***	1,833***	537.0**	-293.9***	12,628***	2,252***	1,179***	-82.10
	(516.2)	(168.7)	(204.5)	(76.14)	(1,338)	(405.7)	(250.6)	(56.92)
Unempl.	3.2e+06	-1.230e+06	-951,936*	-879,008	-1.3e+07*	-2.9e+06	-2.4e+06***	-88,397

Rate	(4.2e+06)	(1.4e+06)	(511,135)	(511,784)	(6.960e+06)	(2.1e+06)	(804,388)	(550,490)
Urbaniz. Rate	-8.1e+06**	-2.520e+06	581,596	456,154	6.351e+06	-432,287	918,465*	398,730
	(3.5e+06)	(1.6e+06)	(628,980)	(1.4e+06)	(7.200e+06)	(2.3e+06)	(503,560)	(468,515)
Oblast FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.013e+06	1.722e+06	-13,389	276,596	256,022	1.3e+06	469,074	-103,622
	(2.8e+06)	(1.4e+06)	(396,421)	(774,603)	(6.023e+06)	(1.8e+06)	(448,553)	(442,341)
Obs.	79	79	79	79	81	81	81	81
R-sq.	0.863	0.748	0.495	0.482	0.874	0.843	0.911	0.311
# of oblasts	16	16	16	16	17	17	17	17
Within R-sq	0.863	0.748	0.495	0.482	0.874	0.843	0.911	0.311
Notes: Robust standard errors clustered at oblast level are in parentheses. Stars indicate statistical significance (*** p<0.01, ** p<0.05, * p<0.1)								

Short-term effects on SME gross value added are more narrowly concentrated. Table 6 shows a statistically significant increase in gross value added for small enterprises, of roughly 137 billion KZT, and a positive and significant effect for medium enterprises of about 46 billion KZT in the immediate post-reform years. These results point to short-run productivity or efficiency gains among established SMEs, rather than broad-based value creation across all firm categories.

Table 6. The impact of the reform on SME Gross Value Added in short and medium term

	(1)	(2)	(3)	(4)
VARIABLES	Small	Medium	Small	Medium
Post Reform (short)	137,108*	46,208**		
	(69,945)	(20,434)		
Post Reform (medium)			351,334	114,356
			(287,390)	(82,531)
GRP Per Capita	227.5***	37.00***	-17.13	-0.311
	(25.89)	(7.922)	(46.36)	(3.496)
Population Density	7,355***	1,536***	11,367***	1,707***
	(613.5)	(148.5)	(1,847)	(349.4)
Unemployment Rate	-3.739e+06	-1.828e+06	-1.523e+07*	-2.322e+06
	(3.998e+06)	(1.193e+06)	(8.251e+06)	(1.684e+06)
Urbanization Rate	-7.778e+06*	-1.865e+06	6.682e+06	98,990
	(4.030e+06)	(1.225e+06)	(6.737e+06)	(1.751e+06)
Oblast FE	1.623e+06	372,412	-1.157e+06	-24,051
Constant	4.587e+06	1.633e+06	1.198e+06	777,154
	(2.986e+06)	(1.042e+06)	(5.765e+06)	(1.337e+06)
Observations	79	79	81	81
R-squared	0.907	0.805	0.871	0.837
# of oblasts	16	16	17	17
Within R-sq	0.907	0.805	0.871	0.837
Notes: Robust standard errors clustered at oblast level are in parentheses. Stars indicate statistical significance (*** p<0.01, ** p<0.05, * p<0.1)				

The medium-term estimates (2022-2023) suggest that the reform's impact on SME output persisted for selected firm types, though not uniformly across the sector. As shown in Table 5, individual entrepreneurs exhibit a large and statistically significant increase in output, with average gains of approximately 117 billion KZT, indicating sustained expansion in micro-entrepreneurial activity. Medium enterprises also show a positive and statistically significant medium-term output effect, on the order of 206 billion KZT, while the estimated increase for small enterprises, although sizable in magnitude, is not statistically significant. Output effects for agricultural SMEs are positive but imprecisely estimated in the medium term.

In contrast, the medium-term results for SME gross value added (Table 6) do not show statistically significant effects for either small or medium enterprises, despite positive point estimates. This suggests that much of the value-added response to the reform may have materialized in the short run, with subsequent output growth driven more by scale expansion than by continued improvements in productivity. Overall, the medium-term evidence indicates that the CIT revenue decentralization was associated with sustained output growth in specific SME segments—particularly individual entrepreneurs and medium-sized firms—while medium-term gains in aggregate value added appear more limited.

Discussion and Conclusion

This paper examined the impact of Kazakhstan's 2020 amendment to the Budget Code—specifically the reallocation of corporate income tax (CIT) revenues from small and medium enterprises (SMEs) to regional budgets—on SME performance across oblasts over the period 2017–2023. The reform represented a meaningful step toward fiscal decentralization by strengthening local governments' fiscal incentives to support private sector activity. Using oblast-level panel data and fixed-effects models, the analysis finds that the reform was associated with selective but economically meaningful improvements in SME performance, particularly along the intensive margin of production and employment.

The results indicate that the reform's effects were heterogeneous across outcomes, firm types, and time horizons. In the short run (2020-2021), SME employment increased significantly among small enterprises, while SME output and gross value added rose notably for selected firm categories, including medium enterprises, individual entrepreneurs, and agricultural SMEs. In the medium term (2022-2023), the evidence points to sustained output expansion among individual entrepreneurs and medium-sized firms, while effects on employment and value added become less precisely estimated. Effects on SME registration are present but uneven, suggesting that the reform primarily stimulated expansion and scaling of existing firms rather than broad-based entry. Taken together, the findings suggest that enhanced subnational fiscal incentives translated more strongly into higher production and activity levels than into persistent gains in firm creation or productivity growth.

These findings contribute to the literature linking fiscal decentralization to local economic performance by highlighting the importance of incentive alignment at the subnational level. Consistent with theoretical arguments and empirical evidence from other contexts (e.g., Oates, 1999; Martínez-Vázquez and McNab, 2003), the Kazakhstan experience suggests that when local governments retain a greater share of business tax revenues, they have stronger incentives to facilitate economic activity within their jurisdictions. The differentiated responses across SME categories are also in line with prior evidence from transition and developing economies (Akai and Sakata, 2002), which shows that smaller and more flexible firms tend to respond more quickly to improvements in local fiscal and administrative environments.

Several limitations warrant consideration. First, the analysis relies on oblast-level data, which may mask important heterogeneity across raions and individual firms. Second, the relatively short post-reform window constrains the ability to assess longer-term structural effects or persistent productivity gains. Third, although the empirical strategy incorporates fixed effects, event-study diagnostics, and robustness checks using alternative time trends and lagged controls, some endogeneity concerns may remain if unobserved local policy initiatives or investment dynamics coincided with the reform. Future research using firm-level data, longer panels, or detailed information on local fiscal spending could provide deeper insights into the mechanisms through which fiscal decentralization affects entrepreneurship, employment, and regional development.

Finally, the reform also coincides with the presence of COVID-19 pandemic that started in 2020 and continued to have a large impact through 2021. Unfortunately, in the absence of reliable panel data on incidence and severity of COVID-19 statistics, we are not properly able to control for it. However, we argue that controlling for oblast level unobserved characteristics probably controlled for some of the impact across regions of Kazakhstan. Moreover, given that we observe largely positive results and assuming that COVID-19 would have had negative impact on SME outcomes, we can argue that what we find is lower-bound of the impact of the reform and the impact would have been even higher in the absence of the pandemic.

Furthermore, it is important to note that the fiscal decentralization landscape in Kazakhstan is still evolving, hence the findings of this study should be interpreted within this context. After the 2020 reform, a number of policy changes have been implemented, alongside ongoing discussions on further fiscal decentralization measures. Amendments to the Budget Code adopted in 2024, followed by the approval of a revised Budget Code in 2025, have aimed to strengthen the institutional foundations of intergovernmental fiscal relations by improving fiscal transparency, clarifying expenditure responsibilities, and expanding the role of subnational budgets (Budget Code of the Republic of Kazakhstan, 2024).

In parallel, official policy discussions in 2024-2025 have increasingly emphasized the need to reduce regional dependence on intergovernmental transfers and to enhance own-source revenue capacity at the oblast and district levels, reflecting persistent concerns about vertical fiscal imbalances in Kazakhstan's fiscal system (World Bank, 2023). While these recent amendments do not alter the empirical scope of this analysis, they underscore that the 2020 CIT reform examined in this paper forms part of a broader and ongoing decentralization process.

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Corporate Social Responsibility and the Perception of Ethical Marketing among Students of Economics, Marketing, and Management

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Abstract

This study examines how university students understand and respond to the concept of Corporate Social Responsibility (CSR) and ethical marketing. The research involved 110 undergraduate students from economics, marketing, and management programs at South Kazakhstan Research University named after M. Auezov and was conducted using a quantitative, cross-sectional design. Data were collected online through Google Forms and WhatsApp to ensure accessibility and participation. The study tested three hypotheses: that higher CSR awareness is associated with more favourable attitudes toward socially responsible companies; that positive attitudes foster greater trust and socially responsible consumer behaviour; and that students from different academic fields (Marketing, Management, and Economics) differ in their levels of CSR awareness and behavioural responses. The results show that students generally have a high level of CSR awareness (M = 4.96) and positive attitudes toward socially responsible companies (M = 4.87). Correlation analyses confirmed significant positive relationships between awareness, attitude, and behavioural impact, supporting the first two hypotheses. However, one-way ANOVA revealed no significant differences across fields of study, suggesting that CSR awareness and related behaviours are shared values among business students. Overall, the findings indicate that while CSR and ethical marketing are well-recognised concepts, practical understanding remains limited. The study recommends expanding CSR education through case-based and experiential learning and strengthening university–industry collaboration to cultivate ethical awareness and sustainable business values among future professionals.

Keywords: corporate social responsibility (CSR), ethical marketing, student perception, consumer behaviour, business education, marketing.

Introduction

In the modern economy, corporate social responsibility (CSR) and ethical marketing are indicators of a sustainable business strategy and the building of public trust (Nguyen and Rowley, 2015). Companies understand that a reputation built on transparency, fairness, and social responsibility is not only a matter of morality (ethical principles) but also a strategic advantage—an advantage that strengthens long-term competitiveness. CSR as a concept extends beyond voluntary assistance and includes organizational accountability, environmental protection, and stakeholder engagement. Furthermore, marketing ethics emphasizes fairness, honesty, and respect for consumers and society (Sarwari, Minar, and Alam, 2025).

As the importance of CSR grows, so does the perception of ethical marketing, reflecting the transformation of global consumer preferences. Younger generations of consumers expect corporations to demonstrate responsibility to people and the planet, not just profit. Recent research has shown that CSR initiatives positively impact educational, social, and environmental outcomes (Tuuli, Fusheini, & Salia, 2023). In Central Asia and Kazakhstan, the institutionalization of CSR and ethical marketing is still developing. Academic discourse in the region still lacks an empirical understanding of how future professionals, such as students of economics, management, and marketing, understand, evaluate, and internalize CSR-related values. This makes this topic particularly relevant for understanding how socially responsible attitudes are formed in future business leaders.

A growing number of international studies link corporate social responsibility (CSR) to companies' financial performance and reputation (Abdimomynova, Duzelbaeva, Berikbolova, Karbozova, & Mukhtarova, 2023). However, there is a gap in research on the perceptions of CSR and ethical marketing among young university students. Most scholarly studies have traditionally focused either on corporate strategies or on consumer reactions of the general population. However, the relationship between ethical marketing, cultural values, and sustainable development identified in Sarwari et al. (2025) study is not examined from the per-

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spective of student awareness. This empirical gap also includes trust development. There is a growing need to study students' understanding of CSR and its behavioral impact in Kazakhstan. This cohort is considered young and already on the threshold of professional activity. Developing a student understanding of CSR and ethical marketing is important for universities specializing in graduating economists, marketers, and management specialists. It is these representatives of the future generation who will shape the ethical foundations of business in the region. Adiva, Widvarti, and Ciptaningtias (2023) discussed the development of ethically conscious employees. Their work describes CSR programs based on corporate governance principles and the "triple bottom line" concept—a concept that connects people, the planet, and profit.

The study's findings can provide universities, policymakers, and corporations with evidence-based strategies for strengthening CSR education and integrating ethical principles into business curricula. This will ensure ethical responsibility is a central element of future management practice.

The study we present examines perceived aspects of CSR and trust building. The objective assessment of corporate practices and the students' limited professional experience represent analytical constraints rather than methodological limitations.

This study does not aim to replicate existing research on CSR and consumer preferences. It focuses on students majoring in business with a basic understanding of CSR and ethical marketing. Students' initial perceptions shape their trust and attitudes toward socially responsible companies before they assume positions in which they will be required to make professional and economic decisions (i.e., these perceptions are formed prior to hiring, not employee evaluations). The study also provides empirical data from Kazakhstan, where similar research is currently limited.

The study also examines perceptions of corporate social responsibility (CSR) and ethical marketing during the pre-employment phase. Students associate this phase with an important consumer segment and, simultaneously, with future professionals. Limited experience in the corporate environment does not pose a validity issue in this case, as the key constructs measured in the study (CSR awareness, attitudes, and trust-related behavioral intentions) do not require knowledge of the specifics of CSR implementation. A positive aspect is the lack of professional experience, which allows the analysis to focus on how education, personal values, and CSR communication shape early judgments about trust and ethical principles. Accordingly, the study results are intended to be generalizable to business students and young consumers in Kazakhstan. The results should not be interpreted as assessments made by corporate employees, managers, or CSR specialists.

In summary, this study aims to examine the level of awareness of students in three majors regarding the principles of CSR and ethical marketing. The analysis also reveals attitudes toward socially responsible companies and assesses the impact of CSR on trust and consumer behavior. The study determines how young professionals understand social and ethical standards in business and how trust in socially responsible brands is formed. The findings help develop educational and communication strategies that foster a culture of ethical and responsible management among future professionals. To achieve these goals, the study is based on the following objectives: (1) analyze students' understanding of CSR and ethical marketing concepts; (2) assess their awareness of companies implementing socially responsible initiatives; (3) study their attitudes toward socially responsible brands; (4) determine the impact of CSR on trust and consumer behavior; and (5) formulate recommendations for increasing students' awareness and involvement in ethical business practices.

The research logic is based on the concept that CSR awareness is a cognitive dimension, attitude reflects an affective evaluation, and trust and CSR-related behavior represent behavioral outcomes.

Based on these objectives and theoretical propositions, the following hypotheses are proposed for empirical testing. First, it is hypothesized that higher levels of awareness of CSR and ethical marketing will be positively associated with more favorable attitudes toward socially responsible companies (H1). Second, it is expected that more positive attitudes toward socially responsible companies will be positively correlated with trust and CSR-related consumer behavior (H2).

Although all respondents are enrolled in business-related undergraduate programs, marketing, management, and economics represent distinct specializations with different curricular emphases. Therefore, statistically significant differences between fields of study are expected in students' awareness and attitudes toward CSR, and their impact on their behavior (H3).

Literature review

Concept of Corporate Social Responsibility

CSR is becoming increasingly important as a key element of corporate governance and the sustainable development of companies. CSR encompasses ethical, environmental, business, and social strategies, as well

as a decision-making process. According to Thakur and Devi (2025), CSR functions not only as a strategic tool but also as a primary mechanism for achieving social goals. These goals include corporate responsibility, stakeholder engagement (customers, employees), and ethical behavior.

The real attitude toward CSR and the contradictions between theory and practice are described by our Indian colleague Guha (2025). He notes that, despite legal obligations, companies view CSR as a formal compliance with rules.

There are also new aspects of CSR that are already emerging in the context of digital transformation. Vasin and Prokhorova (2025) introduce the concept of corporate digital social responsibility (the connection between CSR and digital ethics). Remote work for employees is already a well-established minimum. Here, the modern economy includes a technological boom and corporate responsibility, and companies are quickly catching up. Abdimomynova et al. (2023) studied CSR as a factor in correctness and legality, as well as competitiveness. In Kazakhstan, a link between investment and CSR is observed: the greater the investment, the more financially profitable and morally sustainable the outcome. Similarly, Nguyen and Rowley (2015) view CSR in Asia as a system of fairness management that promotes transparency and brand trust.

CSR, together with the corporate governance system and the "triple bottom line" concept, enshrines it at the level of laws, regulations, and organizations. Adiva, Widyarti, and Ciptaningtias (2023) note gaps in transparency and people-centered approaches, which limit overall effectiveness.

With modern trends, CSR has evolved into a comprehensive concept of corporate ethics and accountability. It is influenced by economic, legal, and digital innovations. The lack of empirical data on how CSR is perceived by younger generations and its actual social impact is precisely the problem addressed in this study.

Ethical Marketing and Its Relationship with CSR

Ethical marketing is a practical extension of CSR in the area of market communication. It embraces the principles of honesty, transparency, fairness, and respect for consumers and society. Sarwary, Minar, and Alam (2025) view ethical marketing as a mediating mechanism that transforms internal CSR commitments. When fully implemented, it transforms CSR from a proclaimed principle into a measurable business outcome.

Ethical marketing is fluid and adapts seamlessly to technological and societal changes. Dastane, Aw, Roig, and Sanchez-Garcia (2025) describe the transformation of this discipline due to automation, digitalization, globalization, and sustainability (the ADHOGS framework). Their extensive bibliometric review identified intelligent clusters within ethical marketing. The key cluster indicators were ESG indicators, digital transformation, AI-based personalization, and Islamic marketing. Their research highlights the future of ethical marketing through the ability to integrate data ethics and sustainability into digital ecosystems.

At the same time, Kaushal (2025) highlights existing ethical dilemmas in economic sectors such as pharmaceuticals. Here, aggressive marketing tactics can conflict with moral responsibility and patient welfare. The presented research demonstrates that ethical marketing determines public trust and brand authority, especially in industries with high social impact.

Similarly, Manoukas, Sgora, and Overkleeft (2025) propose the concept of an ethical economy. Here, marketing is not about persuasion but about the co-creation of value and shared responsibility. The authors' analysis of digital and cultural entrepreneurship demonstrates how authenticity, gratitude, and branding strengthen emotional bonds between companies and communities. This model aligns ethical marketing with the goal of CSR—sustainable stakeholder engagement and social benefit.

The analyzed studies demonstrate that ethical marketing and CSR represent an integration of responsible business behavior. Ethical marketing implements CSR by integrating its principles into everyday interactions with the brand, thereby establishing communication strategies (communication plans and methods). Therefore, transparency, authenticity, and cultural sensitivity become essential for maintaining consumer trust and loyalty. With the consistent application of ethical values, marketing becomes a strategic tool for sustainable and socially responsible growth.

Good Corporate Governance and the Triple Bottom Line

The effectiveness of CSR depends not only on the strength of corporate governance mechanisms (transparency, accountability, and ethical decision-making), but also, as Adiva, Vidyarthi, and Chiptanithias (2023) note, adherence to NGO principles allows CSR programs to become a structured process rather than a collection of isolated volunteer activities. The authors also point to shortcomings in the implementation of human-centered corporate governance principles. Many companies still view CSR as a non-core function or

management task. However, the true impact of CSR depends on how deeply ethical values are embedded in management and day-to-day decisions.

The risks of "green washing" in sustainability management are identified by Pratama, Yusoff, Yadiati, and Jaenudin (2025). The key finding of these researchers is that internal development departments prioritize image over results. Consumers lose trust in such companies and their reports. This is evident in the studied countries, such as Singapore, Malaysia, Thailand, and Indonesia.

Our analysis highlights unified and mandatory governance mechanisms that link CSR policies to real accountability. Without oversight, social responsibility can be lost, so integrating corporate governance is only effective if rules are followed.

Involving young people in CSR research is based on their values and awareness in this area. Tuuli, Fusheini, and Salia (2023) found that CSR improves educational infrastructure, including teaching quality and institutional trust. Here, CSR is not about profit but about motivation, social awareness, and equality.

A study by Che et al. (2025) examined CSR in Chinese universities, focusing on faculty well-being and organizational climate. It was shown that CSR aligned with faculty values increases satisfaction, respect, and loyalty. Therefore, socially responsible engagement contributes to both individual well-being and institutional success.

From a student perspective, Saxena and Mishra (2017) found that students in India and Mauritius associate CSR with long-term success and ethical reputation. Rather than focusing on profit, their study focuses on the role of management education in shaping ethical business values and the role of the university in transmitting these values to future leaders.

Sarmah, Khatun, and Singh (2023) also report that 64 % of young respondents believe that social advertising (PSA) genuinely promotes social initiatives. These initiatives are implemented through the use of stories, music, and famous celebrities. This suggests that young audiences value authenticity and emotional connection in CSR communications. Navi (2014) also found that students consider participation in CSR an important part of their academic and professional development.

In an international study, Licandro et al. (2024) compared management students in Colombia, Ecuador, and Peru, showing that national and institutional contexts shape CSR perceptions.

Overall, all the studies analyzed above highlight students' awareness and interpretation of CSR. University students, particularly those studying economics, marketing, and management, constitute a key group whose values and ethics shape the future behavior of corporations. Empirical data is sometimes insufficient to fill all the gaps in the Asian region. Our study examined Kazakhstani students living in the southern region. We examined CSR principles, respondents' understanding of social responsibility, ethical marketing, and how these factors might influence future decision-making.

Marketing Students

The integration of CSR with marketing, theoretical perspectives, and ethical responsibility between consumers and companies was studied by Sanclemente-Téllez (2017). The study emphasizes that marketers can apply CSR principles to build trust in brands by emphasizing the marketing ethos itself rather than profit.

Carvalho, Nogueira, and Martins (2023) observed in their study that marketing students do not treat different groups equally in their business projects, thereby demonstrating social and environmental responsibility. However, the application of this concept begins after a targeted educational intervention. After CSR-focused training, students demonstrated significantly higher awareness. Students' preferences for choosing socially responsible companies were observed specifically after formal education in CSR and ethical perspectives on marketing.

Economics Students

An earlier study by Ham, Pap Vorkapić, and Pezić (2015) examined the attitudes of business students toward CSR in Eastern Croatia. The study found generally positive attitudes toward CSR, but also noted differences in understanding between undergraduate and graduate students. The authors emphasized that education plays a key role in fostering awareness and readiness for socially responsible business practices. Students represent future decision-makers who will influence corporate ethics and sustainable development.

This idea is also supported by Zientara, Adamska, and Bak (2025). Economics students generally hold a positive theoretical attitude toward CSR, but may shift toward a profit-oriented mindset. This is due to real-world management contexts (theory differs from practice). This theory addresses the influence of neoliberal economic education on the need to integrate ethical and social aspects into economics curricula to balance financial priorities and social responsibility.

Business and Management Students

Frizon, Eugenio, and Morais (2024) examined business students' CSR orientation and found that their expectations regarding corporate environmental and social initiatives had a strong influence on their CSR values. Students from Portugal and Brazil favored non-profit motives and a commitment to sustainable development. Rather than focusing on profit, students espoused CSR as a strong predictor of future professional ethics among management students.

Mallik, Brijlal, and Sahu (2022) conducted a study among MBA students in Bhubaneswar, India. After collecting 294 respondents, the researchers identified eight factors shaping CSR perceptions. The key factors include: responsibility to companies and consumers, responsible management, ethical commitments, and humanitarian responsibilities (protecting human rights, helping those in need, etc.). The study's results indicate that management students expect companies to operate responsibly and with a CSR focus. This helps shape corporate strategy and generate useful insights, even at the regional level.

Summary of the Literature Gap

The literature review shows that business ethics and corporate transparency are measured by CSR and ethical marketing.

Research confirms that CSR initiatives, guided by corporate governance principles and the "triple bottom line" model, enhance both corporate reputation and social well-being (Adiva et al., 2023; Pratama et al., 2025).

Research in the field of ethical marketing emphasizes its role in translating CSR principles into consumer trust and loyalty through fairness and authenticity in communication (Sarwari et al., 2025; Dastane et al., 2025). At the same time, recent works highlight the growing importance of youth education and perceptions in shaping future business ethics (Che et al., 2025; Saxena & Mishra, 2017; Singh et al., 2023; Licandro et al., 2024).

However, empirical research on how students in transition countries like Kazakhstan perceive CSR and ethical marketing remains limited. Our study closes this gap by analyzing the awareness, attitudes, and behavior of students studying economics, marketing, and management.

Methods

Participants

A total of 110 students participated in the survey (South Kazakhstan Research University named after M. Auezov, Shymkent). The majority were female (84.5 %), while male respondents accounted for 15.5 %. Most participants were aged 18–20 years (58.2 %), followed by 21–23 years (23.6 %), with a small number of respondents under 18 (7.3 %) or over 23 (10.9 %) (Table 1).

In terms of academic background, the largest group consisted of second-year students (44.5 %), with smaller proportions from third-year (17.3 %), fourth-year (16.4 %), first-year (8.2 %), and Master's programs (13.6 %).

Demographic data (age, gender, and year of study) were used to describe the sample and account for potential differences among respondents across fields of study: marketing (46.4 %), management (31.8 %), and economics (21.8 %). This distribution provided a balanced representation of students from key business-oriented disciplines for the study of awareness and perceptions of CSR and ethical marketing in future professional groups.

Table 1. Respondents' profile (n=110)

Parameters	Variable	Frequency (n)	Percentage (%)
Gender	Female	93	84.5
	Male	17	15.5
Age	Under 18	8	7.3
	18–20 years	64	58.2
	21–23 years	26	23.6
	Over 23 years	12	10.9
Year of Study	1st year	9	8.2
	2nd year	49	44.5
	3rd year	19	17.3
	4th year	18	16.4
	Master's	15	13.6
Field of Study	Marketing	51	46.4
	Management	35	31.8
	Economics	24	21.8

Participation in the survey was voluntary and anonymous. Students in the selected major were considered either as a separate group or as a whole, depending on the type of study.

Research Methodology

The quantitative, cross-sectional approach used in the study examined students' awareness, attitudes, and behavioral responses to corporate social responsibility.

The study utilized a Likert scale from 1 (Strongly Disagree) to 6 (Strongly Agree).

Regardless of the number of companies mentioned by respondents, statistical analysis methods were used.

Instruments

The questionnaire consisted of four thematic sections, addressing the research objectives:

Section 2 — Awareness of CSR and Ethical Marketing;

Section 3 — Attitudes Toward Socially Responsible Companies;

Section 4 — The Impact of CSR on Trust and Consumer Behavior.

Open-ended questions in which students named socially responsible companies were not used to test hypotheses or construct a scale.

Procedure

Data collection for analysis took place in the fall of 2025, using Google Forms. Before the survey began in the first block, students were familiarized with the study objectives and consented to data processing. The average response time was 10–12 minutes.

Data Analysis

The analysis was conducted using SPSS Statistics (version 28). In the first stage, descriptive statistics (percentages, frequency distributions, and mean scores) were calculated. Thematic content analysis (qualitative) helped identify recurring themes and patterns in students' perceptions of CSR and their expectations of companies.

In the second stage, the following hypotheses were tested: Pearson correlation analysis was used to test the relationship between CSR awareness and attitude (Hypothesis 1), as well as between attitude and influence (Hypothesis 2). Normality tests (Kolmogorov–Smirnov and Shapiro–Wilk) were used to check the distribution of data across academic fields. One-way analysis of variance (ANOVA) followed by a Tukey test was used to determine differences in CSR awareness among marketing, management, and economics students (Hypothesis 3). All analyses were conducted at a significance level of $p < 0.05$.

Ethical Considerations

The study was conducted in accordance with the ethical standards of the academic policy of South Kazakhstan Research University named after M. Auezov. Participants' anonymity and confidentiality were guaranteed, and no personal data was collected. The study was conducted exclusively for academic purposes, without any financial or institutional conflicts of interest.

Results

The internal consistency of the scales presented in Table 2 meets or exceeds the acceptable threshold ($\alpha \geq 0.70$), indicating the reliability of the questionnaire items in each block.

The "Attitude" block ($\alpha = 0.822$) has strong internal consistency. The "Awareness" block ($\alpha = 0.804$) also demonstrates high reliability. The "Influence" block ($\alpha = 0.773$) meets the acceptable reliability standard, given the diversity of responses.

Table 2. Reliability Statistics by Scale

Scale (Block)	Cronbach's Alpha (α)	N of Items	Reliability Level
Awareness of CSR and Ethical Marketing	0.804	5	High
Attitude Toward Socially Responsible Companies	0.822	5	High
Impact of CSR on Trust and Behaviour of Consumers	0.773	5	Acceptable

The results demonstrate a generally high level of student awareness and engagement with the concept of CSR (Table 3). The mean score of 4.96 out of 6 indicates a deep understanding of CSR principles, and the low variance (0.25) confirms the relative homogeneity of the responses.

Following awareness, the analysis shifted to perception (M=4.87). Students expressed a positive attitude toward companies implementing CSR practices. The proportion of students who were critical of companies' motives did not outweigh the overall score.

An analysis of behavioral results (M = 4.84) indicates a significant impact of CSR on students' trust and purchase intentions. However, the observed range of responses (SD = 0.53, min = 2.4) suggests that not all

students respond to corporate social responsibility in the same way. This difference may be due to individual experience, familiarity with corporate practices, and varying levels of trust in specific brands.

Table 3. **Overall perception of CSR and ethical marketing**

Indicator	**Awareness**	**Attitude**	**Impact**
Mean	4.96	4.87	4.84
Median	5.0	4.8	4.8
Standard Deviation	0.49	0.53	0.53
Range	2.8–6	3–6	2.4–6

To assess students' understanding and awareness of CSR and ethical marketing, five indicators were analyzed: knowledge of the concept of CSR, familiarity with socially responsible companies, understanding of ethical marketing, and discussion of CSR topics at university. The results were grouped by field of study—marketing, management, and economics—and average scores were calculated for each group, as shown in Table 4.

Table 4. Awareness of CSR and Ethical Marketing by Field of Study (Block 2)

Indicator	Marketing (n = 51)	Management (n = 35)	Economics (n = 24)
Knowledge of the term *CSR*	5.02	5.00	4.96
Knowledge of company examples	5.02	4.97	4.92
Understanding of ethical marketing	4.82	4.94	4.96
Discussion of CSR topics at university	4.78	5.09	5.04
Desire to learn more about CSR	4.80	5.20	5.04
Overall mean	4.89	5.04	4.99

Management students (n = 35) demonstrated the highest overall awareness of CSR and ethical marketing principles (M = 5.04), particularly in terms of motivation for further study (M = 5.20).

Marketing students (n = 51) showed consistent but slightly lower mean scores (M = 4.89), while economics students (n = 24) maintained stable scores across all items (M = 4.99).

These results suggest that CSR and ethics topics are discussed and integrated into management education more actively than in other fields.

To assess which companies students considered socially responsible, participants were asked the open-ended question: "Which company do you consider socially responsible?"

Of the 110 students surveyed, 100 provided valid responses, which were grouped and analyzed to identify the most frequently mentioned brands (Fig. 1).

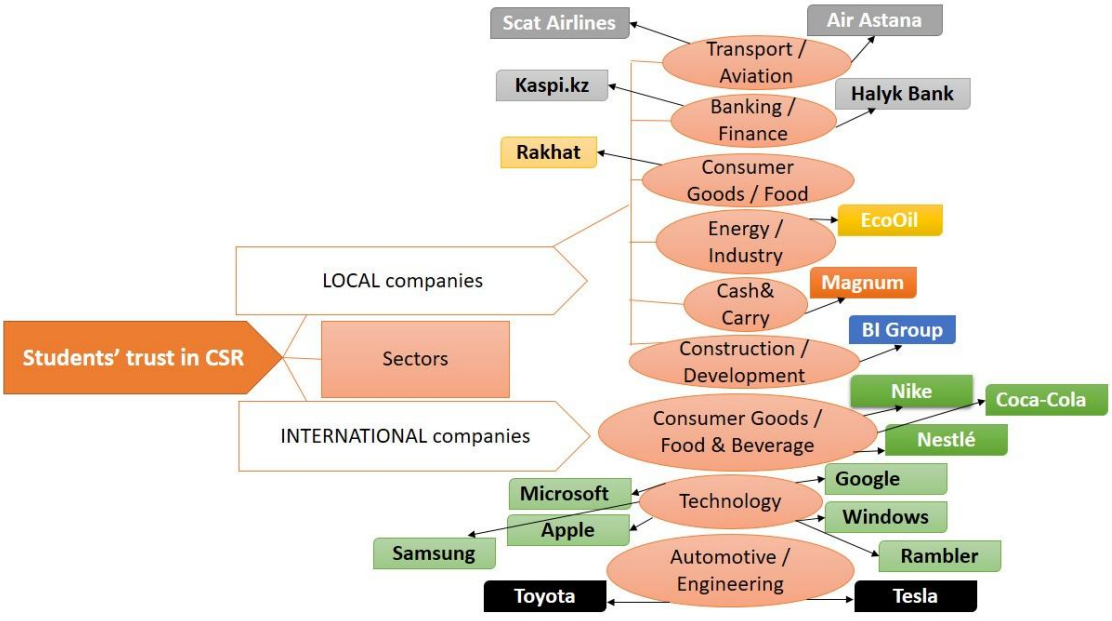

Figure 1. Distribution of Students' Trust in Socially Responsible Companies by Origin and Sector

The concept map presented the distribution of responses by company origin: local (Kaspi.kz (12 mentions) and Scat Airlines (8), followed by Air Astana (2), Halyk Bank (2), Magnum (3), Rakhat (3), EcoOil (1), and BI Group (4). Local brands were mainly associated with transparency, support for education, and initiatives in the field of environmental protection or public interest; international (Tesla (12 respondents), symbolizing innovation, sustainability, and ethical business practices. The following numbers of international brands were also mentioned: Nestlé (3), Coca-Cola (2), Microsoft (2), Google (3), Apple (2), Toyota (2), Nike (2), and Samsung (1).

It's worth noting that students trust both local and international companies equally. Kaspi.kz and Air Astana emerged as Kazakhstan's leaders in CSR in our study.

Ten respondents refrained from listing the companies they trusted.

Analysis of the responses to the open-ended questions, presented in Figure 1, suggests that students, primarily, effective CSR implementation is associated with several specific areas: (1) transparency and honesty in corporate communications; (2) environmental responsibility and green practices; (3) socially oriented initiatives (education and community support); (4) ethical marketing—without manipulation and aggressive promotion; and (5) perceived authenticity of CSR actions—without image-building activities. These aspects represent CSR practices that are most likely to contribute to building trust and forming positive behavioral intentions among young audiences.

Thirty-six respondents identified environmental responsibility in open-ended questions as a link between CSR and environmental friendliness: "All environmentally friendly companies".

An analysis of the mean scores for students' attitudes toward socially responsible brands in Table 5 shows that students in all three test groups consistently demonstrate positive emotional and value-based attitudes toward socially responsible brands. Mean scores range from 4.6 to 5.3 on a six-point scale.

Managers have a positive attitude toward CSR, with mean scores exceeding 5.0. This category of students is aware of the strategies and benefits of the subject they are studying. Economists also highly support CSR initiatives. They value recognizing the impact on brand reputation and trust in the organization. Marketers show slightly lower but consistent mean scores. They are more pragmatic and balance CSR with market and promotion strategies.

Table 5. Mean scores of students' attitudes (Block 3)

Indicators	Marketing (n = 51)	Management (n = 35)	Economics (n = 24)
Sympathy toward socially responsible brands	4.92	5.26	5.08
Preference for CSR companies' products	4.71	5.00	5.04
Impact of CSR on brand reputation	4.63	4.83	4.96
Trust in transparent CSR brands	4.67	5.00	4.92
CSR is more important than aggressive marketing	4.69	5.00	4.88

The survey results show that students positively evaluate companies and brands that behave socially responsibly. Companies that openly demonstrate their CSR activities inspire trust in our respondents. Students also believe that aggressive advertising has less of an impact on them than the social responsibility demonstrated by companies.

Block 4 included four behavioral indicators measuring the impact of CSR on student trust and consumer behavior. Respondents' willingness to pay more for socially responsible products and their perception of the lack of impact of CSR on brand trust and purchase decisions were assessed. Additionally, one statement was reverse-answered to assess perceptions of CSR authenticity.

Table 6. Mean scores of the influence of CSR on students' trust and consumer behaviour (Block 4)

Indicators	Marketing (n = 51)	Management (n = 35)	Economics (n = 24)
CSR increases my trust in a company.	**5.16**	5.11	5.08
I am willing to pay more for CSR companies' products.	**4.98**	4.71	4.79
The absence of CSR reduces my trust in a brand.	4.78	4.74	**4.83**
CSR influences my purchasing decision.	4.65	4.69	**4.79**
CSR is more of a PR move than real action. (reverse item)	4.73	4.71	**4.79**

Average scores (ranging from 4.6 to 5.2) demonstrate consistently positive attitudes toward CSR across all respondent groups. The highest scores were obtained for the statement "CSR increases my trust in the company" (M ≈ 5.1). This indicates that CSR is viewed as a key factor determining brand trust. Similarly, the statements "The absence of CSR reduces my trust in the brand" and "CSR influences my purchase decision" (M ≈ 4.7–4.8) indicate that students perceive CSR as a critical factor influencing both emotional trust and behavioral decisions.

Respondents' responses to the statement "I am willing to pay more for products from companies that engage in CSR" (M ≈ 4.8–5.0) demonstrate a willingness to support socially responsible brands, even if their products are more expensive. The reverse-worded statement, "CSR is more about PR than actual action", received moderate mean values approximately 4.7–4.8). This indicates that most respondents do not view CSR merely as advertising and recognize its true social impact.

This demonstrates that CSR is an important factor influencing students' trust, perceptions of companies, and consumer behavior. Higher levels of CSR awareness are associated with more positive and engaged attitudes toward socially responsible companies.

Management students demonstrate the highest level of CSR awareness (M = 5.04) and the greatest desire to learn more about it (M = 5.20), positive behavioral responses, including a high level of trust in companies engaged in CSR (M = 5.11) and agreement that CSR influences their purchasing decisions (M = 4.69).

Economics students also had a high level of awareness (M = 4.99), as did their assessment of the impact of CSR on brand reputation (M = 4.83) and willingness to pay more for responsible companies (M = 4.79).

Marketing students' average scores were distributed as follows: awareness (M = 4.89), behavioral assessments (trust M = 5.16; willingness to pay more M = 4.98). This suggests that even modest knowledge of CSR positively influences consumers.

Overall, the observed pattern suggests a moderate positive correlation between CSR awareness and socially responsible consumer behavior: students who are more familiar with CSR concepts and examples are also more likely to trust, support, and purchase products from socially responsible companies. These results highlight the educational importance of integrating CSR and ethical marketing topics into university curricula to strengthen students' socially responsible decision-making.

Hypothesis Testing

Using the Pearson correlation coefficient, we assessed the strength and direction of the relationship between two continuous variables. This is consistent with the study's objective—to determine whether knowledge of CSR is associated with a more positive attitude toward socially responsible business practices. The analysis revealed a strong, positive, and statistically significant relationship between students' awareness of CSR and their attitudes toward socially responsible companies, $r(108) = 0.64$, $p < .001$. This result supports Hypothesis 1 and suggests that students with greater knowledge and understanding of CSR principles tend to evaluate companies that implement socially responsible and ethical marketing practices more favorably.

Positive attitudes toward socially responsible companies with greater trust and consumer behavior are revealed through a Pearson analysis between the Attitude and Influence scales. A moderate, positive, and statistically significant relationship is found, $r(108) = 0.44$, $p < .001$.

This finding supports Hypothesis 2, suggesting that students who have more favorable attitudes toward socially responsible companies tend to report greater trust and behavioral intentions driven by CSR initiatives.

Before conducting a one-way analysis of variance (ANOVA), the assumption of normal distribution was tested using the Kolmogorov-Smirnov and Shapiro-Wilk tests for each group (Table 7). The results showed that the data for all three groups—marketing ($p = 0.401$), management ($p = 0.537$), and economics ($p = 0.096$)—did not deviate significantly from a normal distribution ($p > 0.05$). Therefore, the assumption of normal distribution for the ANOVA was met.

Table 7. Tests of normality for the Awareness variable by field of study

Speciality	n	Shapiro–Wilk Statistic	Sig. (p)	Interpretation
Marketing	51	.976	.401	p >.05 → Normal distribution
Management	24	.965	.537	p >.05 → Normal distributionние
Economics	35	.948	.096	p >.05 → Normal distribution

Hypothesis 3 (Field Differences) predicted that there would be statistically significant differences among students from Marketing, Management, and Economics programs in their levels of CSR awareness, attitudes toward socially responsible companies, and the perceived impact of CSR on trust and behaviour.

However, the one-way ANOVA results revealed no statistically significant differences across academic fields for CSR Awareness (Table 8), $F(2,107) = 0.98$, $p = .38$.

Table 8. One-Way ANOVA Results for Awareness across Fields of Study

Source of Variation	Sum of Squares	df	Mean Square	F	Significance (p)
Between Groups	0.485	2	0.243	0.977	0.380
Within Groups	26.562	107	0.248		
Total	27.048	109			

Post-hoc Tukey comparisons further confirmed that the mean scores for Marketing ($M = 4.89$), Management ($M = 4.98$), and Economics ($M = 5.04$) students did not differ significantly ($p > .05$) (Fig. 2).

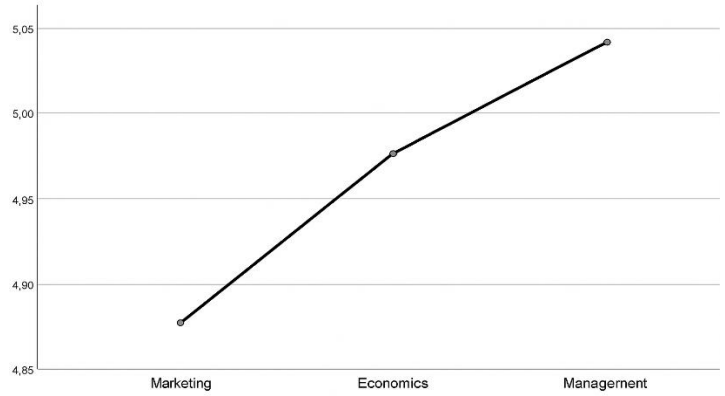

Figure 2. Mean awareness scores across Marketing, Management, and Economics students.

Thus, **Hypothesis 3 was not supported,** indicating that students from different academic disciplines demonstrate **comparable levels of CSR awareness, attitudes, and perceived behavioral impact.** This suggests that the understanding and appreciation of corporate social responsibility principles are relatively consistent across business-related fields of study.

Discussion

The study results confirm that the development and formation of CSR, discussed by Thakur and Devi (2025) and Adiva et al. (2023), is reflected not only at the corporate level but also in the perceptions and values of young people. Students at a research university in southern Kazakhstan demonstrated a relatively high level of awareness of CSR and ethical marketing, indicating that they were already familiar with these concepts at their educational level.

A statistically significant correlation between students' awareness of CSR and their attitudes toward socially responsible companies ($r = .64$, $p < .001$) supports Hypothesis 1: the higher the level of understanding of CSR principles, the better their attitudes toward responsible companies.

This finding is consistent with the work of Sarwary, Minar, and Alam (2025), who argue that ethical marketing transforms CSR from rhetoric into practice, building consumer trust.

The moderate but statistically significant correlation between attitude and behavioral impact ($r = .44$, $p < .001$) further supports Hypothesis 2, suggesting that favorable attitudes toward socially responsible companies foster consumer trust and ethical choices. Sometimes, emotional approval alone is insufficient to drive consistent behavioral engagement; strengthening experiential learning components in CSR education is necessary.

As research on corporate governance and the triple bottom line concept (Adiva et al., 2023; Pratama et al., 2025) demonstrates, ethical values must be embedded within clear frameworks and mechanisms. In an educational context, this can be achieved by integrating CSR principles into various academic disciplines in majors such as management, marketing, and economics. This will help foster the understanding of social responsibility as a structural, rather than secondary, element of business in the selected student population during their studies. Incorporating case-based and project-based learning methods, such as CSR audits, sustain-

ability reports, or collaboration with socially responsible companies, will bridge the gap between theoretical understanding and practical application. This applies to the ethical entrepreneurship models proposed by Manoukas, Sgora, and Overkleeft (2025), where shared responsibility and co-creation enhance the moral dimension of business behavior.

Students' ethical competencies are emphasized through education. According to Che et al. (2025) and Saxena and Mishra (2017), who noted that CSR initiatives in educational institutions foster trust, engagement, and motivation, the study demonstrates that collaboration between universities and companies can significantly enhance students' responsibility now and in their future careers.

Young people remain wary of CSR when faced with aggressive advertising. Therefore, companies should enhance trust and social responsibility through their image. As Vasin and Prokhorova (2025) argue, this is especially relevant in the digital age, where social media and interactive formats are key to building trust among young audiences. Also engaging students as active participants in internships and social projects can strengthen their perception of CSR as a genuine activity. As Sarmah, Khatun, and Singh (2023) note, authenticity and emotional resonance play a central role in how young people evaluate social messages.

A one-way analysis of variance revealed no statistically significant differences between students studying marketing, management, and economics in their levels of CSR awareness, attitudes, or influence on behavior ($p > 0.05$). This finding does not weaken the study, but rather supports the interpretation that CSR awareness has become a common normative value across all business-related disciplines. It also confirms that the principles of sustainable development and ethical responsibility have permeated all curricula, consistent with Hypothesis 3. The fundamentals of responsible business education are learned consistently, regardless of academic specialization.

From a practical perspective, the lack of statistically significant differences between students studying marketing, management, and economics points to an important implication: CSR awareness and related beliefs are formed at a general educational level. This could include CSR curricula for different business majors, as well as business programs.

For companies, this result suggests that CSR communication strategies targeting students and young graduates do not require segmentation by academic specialization. Differences between specializations are minimal. Companies can view business students holistically.

Students' knowledge of CSR shapes their ethical judgment and responsible actions. For education, this means developing ethical competence, critical thinking, and engagement (attitudes) through both curricular and extracurricular initiatives. Companies should communicate transparently, integrating social impact and partnerships with educational institutions. Together, these efforts can create a system where young people not only understand CSR but also internalize it as a professional and ethical principle. This integrative approach is consistent with the broader paradigm of sustainable development and ethical economics described by Manoukas et al. (2025). The model posits that education serves as a bridge between the concept of CSR and its actual social transformation. The main limitation of this study is that it captures CSR perceptions before participants have gained significant experience with the company. Therefore, the results are not generalizable to company employees or managers. Their attitudes toward CSR are already shaped by internal policies, compliance procedures, and constraints. Future studies could replicate this model using new employees already employed by the company. This would directly determine whether professional experience moderates or modifies the relationship between awareness, attitudes, and trust.

Conclusion

This study shows that students majoring in economics, marketing, and management demonstrate relatively high levels of awareness of corporate social responsibility and ethical marketing. It is clear that their understanding of social responsibility, which is ingrained in their university education, influences the development of young people's professional thinking.

The study's results support two hypotheses: greater awareness of CSR leads to more favorable attitudes toward responsible companies and promotes ethical consumer behavior. However, students often perceive CSR in a vague manner, as they are unsure of their nascent experience. This suggests the need for a practical component.

The lack of differences among students majoring in marketing, management, and economics reflects the growing integration of ethics and sustainable development into higher education. CSR is closely linked to positive behavioral intentions, so universities should expand applied training in CSR and ethical marketing. This can be achieved through in-depth research, projects, and partnerships with responsible companies. This

collaboration between academia and business can prepare professionals who combine competence with ethical awareness.

Practical Recommendations

The practical significance of the study lies in the fact that both companies and universities, through CSR initiatives (transparency, ethical marketing, and genuine social engagement), can build trust among future professionals who will form the foundation of management businesses.

For universities, the results highlight the importance of integrating CSR content and ethical marketing into business-related programs. Familiarity with CSR alone does not lead to behavioral engagement—it requires a transition from theory to practice. From an employer perspective, the results demonstrate that CSR is becoming an important factor in shaping employer attractiveness and trust in organizations among young professionals. Only joint programs help reinforce CSR values as a common norm in business education.

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Determinants of women's empowerment in Kyrgyzstan: the mediating role of women entrepreneurship

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Abstract
This study investigates the determinants of women's empowerment in Kyrgyzstan, focusing on the mediating role of women entrepreneurship. Key determinants analysed include access to finance, technical know-how, and financial literacy. Utilising Structural Equation Modelling (SEM) and a structured survey for data collection, the study gathered responses from women entrepreneurs across various regions of Kyrgyzstan. The findings reveal that technical and technological knowledge is the most critical determinant for enhancing women's empowerment. Women with greater technical and technological knowledge exhibit higher levels of empowerment. Additionally, there is a significant positive relationship between access to finance and women's empowerment, indicating that women with better financial access are more empowered. These insights provide a foundation for developing future women's empowerment programmes and contribute to the broader understanding of women entrepreneurship in developing economies.
Keywords: Kyrgyzstan, women's empowerment, women entrepreneurship, SEM

Introduction

Empowerment is recognised as an ongoing and multifaceted journey where individuals progress from a state of "powerlessness and deprivation" to increased strength, influence, and control over resources, particularly within the most marginalised communities (Apisalome and Heidi, 2017).

The term "women's empowerment" emerged in the 1980s within the context of feminism (Calvès, 2009). According to Cornwall (2016), women's empowerment involves recognising and harnessing women's inner power through collaboration with other women to address inequalities. Kabeer (1999) defines women's empowerment as the ability to make strategic life choices that were previously unavailable, highlighting three interrelated dimensions: resources, agency, and achievement.

Women's entrepreneurship benefits the state socially and economically. Women often struggle to balance economic contributions with sociocultural expectations related to home life, pressures which come from both men and women. Understanding these macro-socioeconomic pressures is essential for researching this topic (Ng et al., 2022).

Nieman & Nieuwenhuizen (2003) note that while women constitute about half the population, their business participation, especially in developing countries, is disproportionate. Women's entrepreneurship is crucial for improving living standards, stimulating economic growth, and creating jobs, highlighting the need for increased female involvement in economic development.

Discussions on entrepreneurship began with Schumpeter's 1911 work and were expanded in 1942 (Fontana et al., 2021). The first article specifically on women's entrepreneurship, titled "Entrepreneurship: New Female Frontier", was published in 1976 by Schwartz (Schwartz, 1976). Sajjad et al. (2020) found that women's entrepreneurship boosts economic development and social welfare in 69 countries. However, theories from advanced economies may not apply to non-OECD and emerging economies (Hisrich and Öztürk, 1999). Rashid and Ratten (2020) noted that women in SAARC countries often balance family and business, and Anderson and Ojediran (2022) highlighted that necessity often drives women's entrepreneurship in developing countries.

Kyrgyzstan, a landlocked Central Asian country that gained independence in 1991, has a population of 6.8 million and a GDP of USD 10.9 billion. It is classified as a lower-middle-income country with a life expectancy of 71.8 years (World Bank, 2022). Ranked 118th in human development, Kyrgyzstan has labour participation rates of 42.1 % for women and 71.7 % for men (UNDP, 2022). The World Economic Forum's Global Gender Gap Report (2023) places Kyrgyzstan 84th overall, with better performance in "Economic Participation and Opportunity" (71st) and "Educational Attainment" (29th). In 2022, women's employment was 48.4 % compared to 77.2 % for men, with urban women employed at 53.3 % versus 45.3 % in rural areas (NSCKR, 2023). Furthermore, gender disparity is evident in statistics concerning business leaders. In

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2023, women's representation among business leaders was notably low at 28.75 per cent, compared to 71.25 per cent for men (NSCKR, 2024). Enhancing women's economic activity is crucial for Kyrgyzstan's development.

There is a lack of publications on women's empowerment and entrepreneurship in Kyrgyzstan. Since independence, the country has ratified over 50 international treaties and adopted laws to protect women's rights, yet discrimination persists (Erisheva, 2023). While development interventions can boost women's empowerment, they may be less effective without financial resources or in cases where empowerment levels are already high (Kosec, 2022). A typical Kyrgyz woman entrepreneur is aged 40–50, married with children, and balances work with household duties, often starting her business after 30 following a varied career (Cabinet of Ministers of the Kyrgyz Republic, 2021).

This study contributes to academic scholarship and policymaking by exploring the interplay between women's empowerment, entrepreneurship, and other factors in Kyrgyzstan, addressing the current research gap.

Literature review

Women empowerment and women entrepreneurship

In the scholarly literature, the relationship between entrepreneurship and economic growth is often framed by the premise that small firms act as the engine of economic development (Beck and Demirguc-Kunt, 2006) and play a crucial role in emerging private sectors within formerly planned economies (Hallberg, 2001). Despite numerous initiatives supporting women's entrepreneurship, there remains a notable gap in research specifically addressing women's empowerment and entrepreneurship within Central Asian economies.

One significant area of debate in this field concerns the performance disparity between male and female entrepreneurs. The "constraint-driven gap" perspective posits that female entrepreneurs encounter substantial gender-specific obstacles that restrict their performance (Bardasi, Sabarwal, & Terrell, 2011). These barriers often include challenges in accessing credit, forming business networks, and navigating bureaucratic processes. Research indicates that while these gaps persist, they tend to narrow as the level of economic development increases (Kelley et al., 2011).

This discussion aligns with the broader global socio-economic transformations that have significantly altered the social and economic roles of women worldwide. Traditionally, studies on women's empowerment have focused on metrics such as education, income, and property ownership. For instance, Andriuta and Kartašova (2012) explored two distinct categories of female empowerment: decision-making capacity and social gender equality. This framework highlights three interconnected dimensions of empowerment: resources, actions, and accomplishments, as highlighted by Gupta et al. (2017). Such research consistently demonstrates that women have the potential to make a significant impact on entrepreneurship and economic progress.

Globally, the Global Entrepreneurship Monitor (2019) reports that women's participation in the initial stages of entrepreneurship is approximately three-quarters that of men. Moreover, female entrepreneurs are less likely than their male counterparts to own established businesses. When women are empowered through access to assets, resources, and markets, they often become entrepreneurs, contributing to job creation. This perspective of women's empowerment, which does not challenge the unequal patriarchal social, economic, and political systems, is prevalent in international development (Buisson et al., 2022). Nevertheless, startups and enterprises led by women have been shown to play a vital role in reducing unemployment and driving economic growth (Hechavarria et al., 2019). Entrepreneurship boosts women's visibility and recognition. Factors like literacy, NGO membership, training, and personal business income enhance women's emancipation despite social and cultural barriers and resource access difficulties (Naveen et al., 2023). By providing women with the opportunity to utilise their income for household and family objectives, entrepreneurship can enhance both physical and financial well-being for their families and children, highlighting its profound impact on economic and social outcomes.

H1: Women entrepreneurship has a positive and significant impact on women empowerment

Access to Finance's Effect on Women Empowerment and Women Entrepreneurship

Ayyagari et al. (2016) define financial constraints as firms being unable to secure necessary funds, thus forgoing investment projects with positive net present value. This issue is particularly severe for small firms, where better access to finance can boost employment. In Central Asia, entrepreneurs in more developed

countries face fewer financial constraints (Nizaeva & Coskun, 2021). Financial system structures and lending infrastructure critically influence access to finance for small firms (Berger & Udell, 2006).

In emerging economies, high capital costs, substantial collateral requirements, and elevated bank charges exacerbate financial constraints for SMEs, making it difficult for them to secure bank loans, especially long-term ones (Mateev et al., 2013). The literature suggests that the financing constraints faced by SMEs are influenced by both firm-specific characteristics and country-specific factors. Given the relatively weak development of the financial system and banking regulations in Kyrgyzstan, it is plausible to hypothesise that women-owned business enterprises are disproportionately affected.

Ownership is a crucial factor influencing the financing constraints of small firms (Nizaeva & Coskun, 2019). In Central Asia, stringent collateral requirements often lead to loan application rejections for small firms, which typically lack substantial tangible assets. Larger firms, with more debt and business collateral, have an advantage (Dias Duarte et al., 2017). This absence of collateral particularly affects women-owned enterprises. Majumdar et al. (2023) identify limited funding and balancing responsibilities as primary challenges for women entrepreneurs. Coleman (2002) argues that funding discrimination against women is not due to gender itself but to characteristics of women-owned businesses, such as small size, poor credit histories, and lack of collateral. Thus, while gender may not directly influence funding decisions, the associated business characteristics do play a significant role.

H2: Access to Finance has a positive and significant impact on women empowerment

H3: Women Entrepreneurship has a mediating role

Technical Know-how's Effect on Women Empowerment and Women Entrepreneurship

Technology significantly enhances women's capacities and resources in outreach, education, lifestyle management, health, and barrier understanding (Mackey and Petrucka, 2021). It allows women to control their labour time and social value, reduce household labour, and generate additional income through alternative activities (Twagira, 2020). Malhotra et al. (2009) found that technologies like the Internet, cell phones, alternative energies, and agricultural innovations empower women in multiple ways. The contraceptive pill gave American women reproductive control, while ICT increased revenues for poor female entrepreneurs and improved household well-being in Bangladesh.

The impact of digital solutions on productivity and innovation is increasingly evident across economic sectors. Gaglio et al. (2022) found that social media and mobile internet use positively affect innovation and labour productivity, highlighting the need for accessible digital technologies. Sujarwo et al. (2022) showed that social media can empower women by training them in content creation and advertising. Additionally, Niroo & Crompton (2022) found that technology enables women to gain health knowledge and postpone pregnancy through egg freezing.

H4: Technical know-how has a positive and significant impact on women empowerment

H5: Women Entrepreneurship has a mediating role

Financial Literacy's Effect on Women Empowerment and Women Entrepreneurship

Rachmadini and Damayanti (2023) assessed financial literacy through various dimensions, including financial planning, financial decisions, financial crises, and financial inclusion. Their findings reveal that financial planning, informed financial decisions, and financial inclusion have a positive impact on women's empowerment. These factors contribute to economic growth, poverty reduction, and create opportunities for women to start businesses and achieve economic independence. Conversely, financial crises were found to negatively affect women's empowerment, leading to increased poverty and job losses.

Similarly, Kumari et al. (2020) confirm the link between financial literacy and women's empowerment, demonstrating that financial literacy plays a significant role in managing income and expenditure, allocating time effectively, enhancing financial well-being (particularly among rural women), and fostering community leadership. Koomson et al. (2021) showed that financial literacy training is important for women's empowerment. However, the impact of training is weaker when it is offered alone, so authors suggested to combine the financial literacy training with women's empowerment module. Impact of the combined training is insignificant after 51 years and above. Moreover, financial literacy training gives better results if it is offered to younger rather than older.

H6: Financial literacy has a positive and significant impact on women empowerment

H7: Women Entrepreneurship has a mediating role

Methodology

The conceptual model for this study is obtained from a paper by Andriamahery and Qamruzzaman (2022). According to the conceptual model, access to finance, technical know-how, the financial liter-

acy of women, and women entrepreneurship impact women's empowerment. Additionally, there is a mediating role played by women entrepreneurship on the relationship between access to finance, technical know-how, and women's financial literacy and women's empowerment. The proxy indicators for each latent variable in the model are obtained from the same study and definitions are displayed in Table 1. The variable for women's empowerment is measured with six latent constructs, women's entrepreneurship by 5 constructs, access to finance by 5 constructs, and technical know-how and financial literacy measured by 5 and 4 constructs, respectively. The proxies are measured via a five-scale Likert scale.

Table 1 Variable definitions

Women's empowerment (WEMP)	Measurement of women's capacity to define their possibilities, choices, and power to act, and to use their ability to be courageous and believe in themselves.
Women entrepreneurship (WENT)	Includes capacity and skill development with innovation, managerial competency, and technical know-how for managing business enterprises.
Access to finance (AtF)	Measures the ability of women and their enterprises to use financial products, including loans, deposits, insurance, other payments, and risk management services.
Technical know-how (TECH)	Refers to technical knowledge, including scientific and technological advancements.
Financial literacy (FL)	Measures understanding and ability to use finance, as well as knowledge, attitude, and skills related to finance.

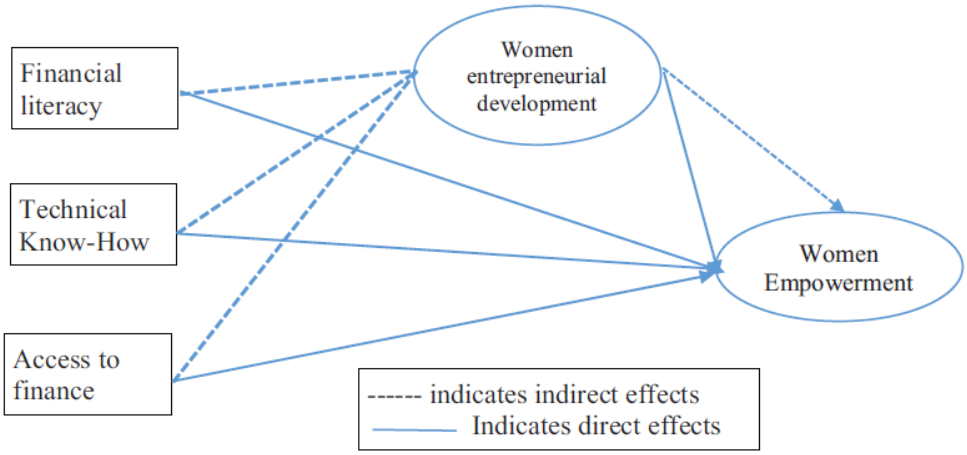

Figure 1. Conceptual Model

Source: Andriamahery and Qamruzzaman (2022)

Data and descriptive statistics

The data used for the analysis was collected through a structured questionnaire consisting of two sections. The first part focused on demographic characteristics such as education level, age, and work experience. The second part consisted of business-related questions, including about enterprise size, year of establishment, and industry. The second section also contained statements evaluating the variables relating to women's empowerment (WEMP), women entrepreneurship (WENT), access to finance (AtF), technical know-how (TECH), and financial literacy (FL). Respondents are female entrepreneurs running their business in all regions of Kyrgyzstan. The data was collected from June to November 2023.

Method: Structural equation modelling

To investigate the causal effects of the women entrepreneurship (WENT), access to finance (AtF), technical know-how (TECH), and financial literacy (FL) variables on women's empowerment (WEMP), and the mediating effect of women's entrepreneurship on women's empowerment, we use partial least squares structural equation modelling (PLS-SEM). Given the ability of PLS-SEM to work efficiently with a much wider range of samples and its less restrictive assumptions about the data (Hair, Ringle, & Sarstedt, 2011), it is an appropriate method for examining the research objective of this paper. Moreover, PLS-SEM allows for the estimation of complex models with many constructs, indicator variables, and structural paths without im-

posing distributional assumptions on the data (Hair et al., 2019). Based upon its user friendliness, ability to analyse the survey data, and to ascertain the significance levels for loadings and path coefficients, SmartPLS 4 software was employed (Ringle et al., 2022).

Demographic characteristics of respondents

One-hundred-and-one (101) responses were received from across all regions of the country, one of these was not suitable for evaluation. Almost half of them (49 responses) were from Bishkek—the capital, and 33 responses were from the densest administrative unit—Osh oblast, which includes the second biggest city—Osh.

Table 2 Geographic location of respondents

Administrative units	Number of responses	Number of Women Heads of Business Entities at the beginning of 2023 (NSCKR, 2024)
Batken oblast	9	15,207
Bishkek city	49	20,526
Chui oblast	3	45,427
Jalal-Abad oblast	0	30,158
Naryn oblast	2	15,644
Osh oblast	30	49,141
Osh city	3	11,516
Talas oblast	1	10,681
Issyk-Kol oblast	3	18,898

The youngest respondent age was 19, while the oldest age was 72; the mean average age of the respondents was 42.8 (with a median age of 43). Year of establishment for the companies where the respondents worked ranged from 1923 to 2023, and the number of employees varied from one to 3000. Kyrgyz law allows anyone to register as an individual entrepreneur and start a business.

Results

Reliability

All variables show high Cronbach's alpha reliability levels (above 0.8) but only financial literacy has a Cronbach's alpha above the acceptable level of reliability (above 0.6). Average variance extracted (AVE) values for all variables are acceptable, despite financial literacy having a lower than 0.5 score. However, if the AVE value is less than 0.5 but the CR is more than the acceptable level of 0.6, then the variable is still acceptable (Lam, 2012).

Table 3 Descriptive statistics of constructs

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
AtF	0.804	0.805	0.863	0.559
FL	0.600	0.641	0.741	0.435
TECH	0.921	0.921	0.941	0.762
WENT	0.853	0.937	0.889	0.623
WEMP	0.805	0.820	0.859	0.507

All variables have composite reliability values above the acceptable level of 0.7, indicating good internal consistency of the constructs.

SEM Results

The coefficients of variables were found to be as follows. The original sample weight of the impact of a variable of 0.20 and higher means that a variable could be significant, while T statistics of 1.96 or higher mean the relationship between the two variables is significant. A P value of 0.05 or less also indicates significance (95 % confidence level).

Table 4 Path coefficients

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
AtF -> WENT	0,154	0,162	0,099	1,550	0,122
AtF -> WEMP	0,252	0,261	0,111	2,276	0,023
FL -> WENT	0,059	0,094	0,123	0,475	0,635
FL -> WEMP	0,045	0,067	0,183	0,248	0,804
TECH-> WENT	0,561	0,529	0,148	3,789	0,000
TECH -> WEMP	0,184	0,170	0,185	0,997	0,319
WENT -> WEMP	0,174	0,189	0,140	1,240	0,216

As reported in Table 4, variables AtF and TECH are found to be significant, all others were found not to be significant. There is a significant relationship between access to finance and women's empowerment, which means that those women who have better access to finance are more empowered. Women with fewer financial constraints have more possibilities, choices, and power to act, and to use their ability to be courageous and believe in themselves. Furthermore, there is a significant relationship between technical know-how and women's entrepreneurship. Women who have technological knowledge have the capacity and skill, alongside innovation, managerial competency, and technical know-how to manage business enterprises.

Table 5 Total effects

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
AtF -> WENT	0,154	0,162	0,099	1,550	0,122
AtF -> WEMP	0,279	0,294	0,113	2,464	0,014
FL -> WENT	0,059	0,094	0,123	0,475	0,635
FL -> WEMP	0,056	0,088	0,178	0,313	0,755
TECH -> WENT	0,561	0,529	0,148	3,789	0,000
TECH -> WEMP	0,282	0,265	0,168	1,676	0,094
WENT -> WEMP	0,174	0,189	0,140	1,240	0,216

Only AtF and TECH are significant, all others are not significant.

Table 6 Total indirect effects

	Original sample (O)	Sample mean (M)	Standard deviation	T statistics (|O/STDEV|)	P values

			(STDEV)		
AtF -> WEMP	0,027	0,033	0,035	0,773	0,440
FL -> WEMP	0,010	0,021	0,036	0,280	0,779
TECH -> WEMP	0,098	0,095	0,078	1,246	0,213

All total indirect effects were found to be not significant.

Table 7 Specific indirect effects

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
AtF -> WENT -> WEMP	0,027	0,033	0,035	0,773	0,440
FL -> WENT -> WEMP	0,010	0,021	0,036	0,280	0,779
TECH -> WENT -> WEMP	0,098	0,095	0,078	1,246	0,213

All variables with specific indirect effects were shown not to be significant.

Regarding the hypotheses tested in this study, H1 is not significant, which means that women entrepreneurship has not a positive and statistically significant impact on women's empowerment. Although in the relevant literature, it has been discussed that women entrepreneurship is pathway to empowerment, the link is very complex and multifaceted, which requires multidisciplinary research and discussion. The insignificant relation may be interpreted with traditional and social gender roles, risk aversion of women, skill gaps. Apart from that, there may be economic factors that may serve as also main factor. In many societies, women tend to prioritize family responsibilities over entrepreneurial ambitions, considering entrepreneurship on the second plan. Therefore, in its current stage, women entrepreneurship is not developed enough to positively affect the women empowerment and mediate other factors' impact on women's empowerment. Women led business entities may face more financial constraints than their male-lead counterparts, which may be proven by our H2. According to findings, women with better access to finance are likely to be more empowered and have capacity to get benefit of their possibilities, choices, and power to act, and believe in themselves.

As observed, technical know-how has a positive and significant impact on women empowerment (H4). As discussed above, women with knowledge of technology are knowledgeable in other aspects too. As concluded by Twagira (2020), by leveraging technological advancements, women are able to reduce household labour time and generate additional income through alternative activities. In H 5, it worths to conclude that even women with better technical knowledge are not engaged in entrepreneurship, they are relatively more empowered. In other words, even not through entrepreneurship, technologically knowledgeable women are more likely to be empowered.

As noted by (Nizaeva & Coskun, 2021), financial literacy is another challenge that hinder most small business owners. Additionally, in Kyrgyzstan, the share of families with trouble making ends due to credits is high. Therefore, although in the relevant literature the link between financial literacy and women's empowerment is positive, the level of women financial literacy is not enough to enhance the empowerment (H6, H7).

Conclusion

In this study I tried to understand the determinants of women entrepreneurship in Kyrgyzstan. All determinants have positive effects on women's empowerment. According to our evaluation, the determinant with highest importance is technical and technological knowledge. To enhance women's empowerment, women should have more access to technology and the knowledge related to it. Next in terms of importance comes access to finance and financial literacy. The findings from this study can offer guidance for the development of future women's empowerment programs in the country and act as a basis for further women entrepreneurship studies.

As it is inevitable in most of micro data, the analysis of this research is also subject to some limitations. For the empirical analysis of the research, the primary data was used that collected by self-administered sur-

vey. In economies with lack of household-level, firm-level, individual-level data, using primary data by survey-based data collection is only solution. However, data collected by such self-administration of respondents are more vulnerable to understandings and perceptions of respondents and findings may be subjective. Despite such shortcoming, due to best of my knowledge, it is one of the pioneering studies that research this topic.

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