SCENARIO FORECAST OF THE SHARE OF DIGITALLY ACTIVE SMALL BUSINESSES IN UZBEKISTAN TO 2030 WITH LINEAR TREND AND LOGISTIC MODELS

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Abstract. Digital policy in Uzbekistan sets goals for platforms, payments and skills, yet official statistics do not report the share of small businesses that use digital tools regularly. The paper takes an expert-assessed series of the share for 2019 to 2024 (18, 22, 27, 31, 36 and 40 percent) and projects it to 2030 with three models, a linear trend, a logistic curve with the ceiling fixed at 85 percent and a logistic curve with a freely estimated ceiling. The linear trend, Y = 13.4 + 4.46t, gives 66.9 percent for 2030 with a 95 percent prediction interval of 65.0 to 68.8 percent. The first logistic variant gives 67.3 percent, and the free variant, whose estimated ceiling is 58 percent, gives 54.4 percent. The gap of 12.5 points between the two paths measures the room that infrastructure, skills and financing measures have to close, and the staged targets of a roadmap for 2026 to 2030 (49 to 53, 58 to 62 and 67 percent or more) are compared against it. The intervals describe trend uncertainty only, because the series is smoothed and expert-based and six observations cannot pin down a saturation level.

Keywords. digital transformation; small business; diffusion; logistic curve; linear trend; scenario forecast; Uzbekistan.

1. Introduction

Digital policy in Uzbekistan is formulated in numbers for infrastructure, services and payments, and annual figures for electronic commerce and cashless receipts are published. Turnover of electronic commerce reached UZS 22.6 trillion in 2025, and the cashless share of receipts in trade and services reached 48 percent (Kursiv Uzbekistan, 2026; Gazeta.uz, 2026). The share of small businesses that use digital tools in their regular work is absent from official statistics, although the Digital Uzbekistan 2030 strategy (President of the Republic of Uzbekistan, 2020) and the programmes for small business support operate on the same population. Programmes that aim to raise the share therefore have no official baseline. A digitally active small business is defined here as an enterprise that regularly uses at least one digital tool, namely digital payment, online sales, a cloud service or electronic document flow.

Forecasts of the share serve a practical purpose. A roadmap for 2026 to 2030 needs a target for every stage and a reference path against which the progress of the stages can be judged. Linear extrapolation of a rising share, the simplest choice, eventually crosses 100 percent, and the diffusion literature has long described technology adoption with S-shaped curves, in which growth slows as the ceiling comes closer (Rogers, 2003). Griliches (1957) fitted logistic curves to the spread of hybrid corn across American states and found that ceilings and speeds differed from state to state, and Bass (1969) gave adoption a model with innovation and imitation components. Evidence from developing economies points to wide and persistent gaps in technology adoption among firms (Cirera et al., 2022), and OECD (2021) studies treat skills, finance and information as the constraints that hold small firms back, so a ceiling below full adoption cannot be ruled out in advance.

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The paper projects the share of digitally active small businesses in Uzbekistan to 2030 with a linear trend and two logistic curves, compares the resulting paths with the staged targets of a roadmap for 2026 to 2030, and examines how far six annual observations can bear a projection.

2. Data and Method

No official series exists, so the annual values for 2019 to 2024 were assessed by the author as the average level of several indicators. The indicators are the Central Bank's data on the share of cashless receipts in trade and services, the register of electronic commerce subjects kept by the National Agency of Perspective Projects, official statistics on internet subscribers and the author's survey of 30 small firms in the Fergana Valley and the Samarkand region, a purposive sample in which about 40 percent of the firms used at least one digital tool regularly. The last value, 40 percent for 2024, was matched to the survey result. The series in Table 1 is therefore an expert estimate and not a measurement.

Table 1. Expert-assessed share of digitally active small businesses, 2019 to 2024

Year	2019	2020	2021	2022	2023	2024
t	1	2	3	4	5	6
Share, %	18	22	27	31	36	40

Three models are fitted to the series with t = 1 for 2019. The linear trend, equation (1), is estimated by ordinary least squares. In the logistic curve, equation (2), the ceiling K is either fixed at 85 percent, on the author's assumption that about 15 percent of small businesses have no use for digital tools, or estimated together with b and t_0 by nonlinear least squares. Equation (3) gives the prediction interval of the linear model for a future point t_f, with n = 6 and four degrees of freedom.

$$Y_t = a + b \cdot t + \varepsilon_t \quad (1)$$

$$Y_t = K / (1 + \exp(-b(t - t_0))) \quad (2)$$

$$\hat{Y}_f \pm t_{0.975;\, n-2} \cdot s \cdot \sqrt{(1 + 1/n + (t_f - \bar{t})^2 / \Sigma(t - \bar{t})^2)} \quad (3)$$

3. Results

3.1. Fitted models and forecasts

All three models reproduce the six observations within 0.7 percentage points (Table 2), so the quality of fit does not separate them. They part ways in the forecast (Table 3 and Figure 1). The linear trend adds 4.46 points a year and reaches 66.9 percent in 2030, with a 95 percent prediction interval of 65.0 to 68.8 percent. The logistic curve with K = 85 stays within 2 points of the trend in every year and gives 67.3 percent in 2030. The freely estimated ceiling is 58.0 percent, and the path from it adds 3.8 points in 2025 and 1.2 points in 2030 and ends at 54.4 percent. The distance between the base and the conservative path is 12.5 points in 2030.

Table 2. Estimated parameters and in-sample fit

Model	Parameters	RMSE, points
Linear trend	a = 13.40; b = 4.46 (R^2 = 0.999)	0.24
Logistic, K = 85 (fixed)	b = 0.238; t_0 = 6.38	0.47
Logistic, K free	K = 58.0; b = 0.320; t_0 = 3.50	0.21

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Table 3. Forecast of the share of digitally active small businesses, %

Year	t	Linear trend	Logistic, K = 85	Logistic, K free
2025	7	44.6	45.6	43.8
2026	8	49.1	50.6	46.9
2027	9	53.5	55.3	49.5
2028	10	58.0	59.7	51.6
2029	11	62.4	63.7	53.2
2030	12	66.9	67.3	54.4

Source. Author's calculations. The 95 percent prediction interval of the linear model for 2030 is 65.0 to 68.8 percent.

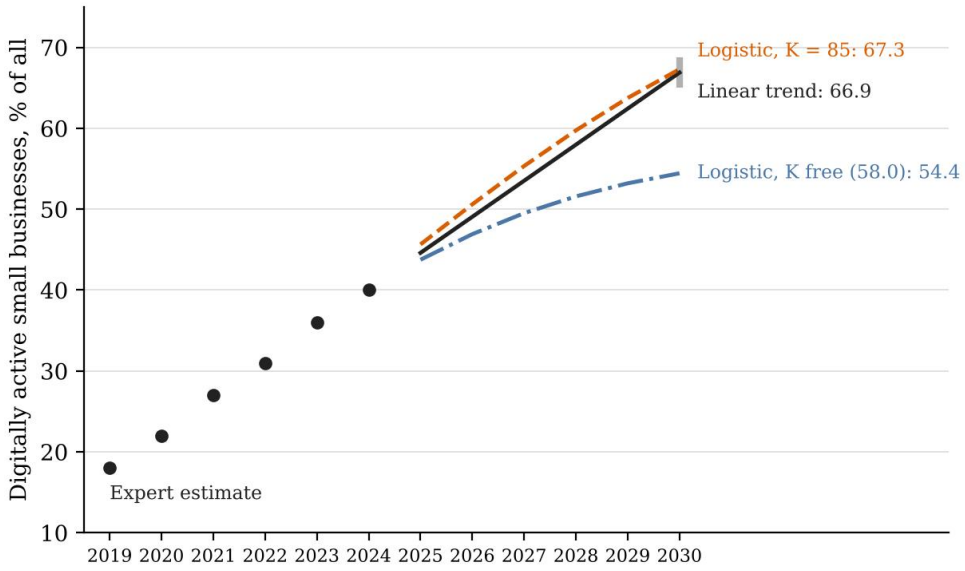


Figure 1. Expert-assessed share, 2019 to 2024, and scenario paths to 2030, % (the grey bar marks the 95 percent prediction interval of the linear trend)

3.2. Comparison with the roadmap targets

The staged targets of the roadmap for 2026 to 2030 are 49 to 53 percent in the first stage, 58 to 62 percent in the second and 67 percent or more in 2030, and they coincide with the linear path (Table 4). The curve with K = 85 stays at or above the targets. The curve with a free ceiling falls below the first-stage target already in 2026, misses the second-stage target by 6 to 9 points and ends 12.6 points under the target of 2030. Companion targets for 2030 in the roadmap are 12 percent for the share of electronic commerce in retail turnover, against 4.6 percent in 2025, and 70 percent for staff with digital skills, against 30 percent in the author's survey of 2025.

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Table 4. Roadmap targets and scenario paths, %

Stage	Years	Roadmap target	Linear trend	Logistic, K = 85	Logistic, K free
I	2026–2027	49–53	49.1–53.5	50.6–55.3	46.9–49.5
II	2028–2029	58–62	58.0–62.4	59.7–63.7	51.6–53.2
III	2030	67 or more	66.9	67.3	54.4

4. Discussion

The statistical measures need careful reading. An R^2 of 0.999 and an interval of ±1.9 points come from a series that the author smoothed from several indicators, and six points leave four degrees of freedom. The interval covers only the sampling error of the trend. An error of 4 points in the last observation, 36 or 44 percent in place of 40, would move the 2030 value of the linear model by 5.5 points, about three times the half-width of the interval, because the end point carries a leverage of 1.38 on the forecast at t = 12. Uncertainty about the construction of the series is therefore larger than the uncertainty that the interval reports, and the scenarios are the more honest summary.

The ceiling is the least identified quantity. The free logistic places its inflection point between 2021 and 2022 ($t_0 = 3.50$) and its ceiling at 58 percent, a reading that follows from a slight bend in the estimated series, and a bend of that size in six smoothed points can come from the way the series was built. The fixed ceiling of 85 percent rests on the author's assumption about the share of firms with no use for digital tools. Griliches (1957) found that ceilings differed between regions and followed economic conditions, so the ceiling of Uzbek small business is unlikely to be a constant, and measures on infrastructure, skills and finance may raise it.

A monitoring rule follows from Table 3. The paths for 2027 are 49.5 percent (free ceiling), 53.5 percent (linear) and 55.3 percent (K = 85). A measured share below 49.5 percent for 2027 puts small business behind all three paths, a value between 49.5 and 53.5 percent places it between the conservative and the base path, and a value above 53.5 percent means that the base path is met or exceeded. Re-estimation every year, with a measured series in place of the expert one once an official indicator exists, would narrow the corridor quickly, because every added observation changes the weight that the end of the series carries (Hyndman & Athanasopoulos, 2021).

The limits follow from the data. The series has six expert-built points, a purposive survey of 30 firms anchors its last value, no covariates enter the models, and the scenarios describe what a trend would give and not what policy will deliver.

5. Conclusion

A linear trend and a logistic curve with a ceiling of 85 percent bring the share of digitally active small businesses in Uzbekistan to about 67 percent in 2030, which matches the roadmap targets. A logistic curve with a freely estimated ceiling stops at 54 percent. The choice between the paths cannot be made on six expert-assessed observations, and the first measured value for 2027 will indicate which path the sector is following. An official indicator for the share of digitally active small businesses would replace the expert series and permit annual re-estimation.

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