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THE EFFICIENCY OF MARKETING COMMUNICATIONS IN LIGHT INDUSTRY ENTERPRISES IN 2023–2025: EVIDENCE FROM THE TEXTILE SECTOR OF THE BUKHARA REGION

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Аннотация. В статье оцениваются состояние и эффективность маркетинговых коммуникаций в лёгкой промышленности Бухарской области Узбекистана в 2023–2025 годах, а также определяется, какие коммуникационные инструменты фактически способствуют увеличению объёма продаж. В исследовании используются два массива данных: отраслевой ряд показателей производства Ассоциации «Узбектекстильпром» за 2017–2021 годы, продолженный до 2025 года методом ограниченной лог-линейной экстраполяции, и сбалансированная панельная выборка четырёх текстильных предприятий за 2015–2022 годы, на основе которой сформирован период оценки и тем же методом определён профиль коммуникаций за 2023–2025 годы. Лог-лог модель с фиксированными эффектами, построенная на 32 наблюдениях «предприятие–год», объясняет 93,4 % вариации чистой выручки от продаж ($F = 48,76$; $p < 0,001$; статистика Дарбина–Уотсона = 1,71). Наибольшую эластичность демонстрируют персональные продажи ($\beta = +1,38$; $p = 0,002$), за ними следуют стимулирование сбыта ($\beta = +1,31$; $p = 0,055$), тогда как эластичность традиционной рекламы является отрицательной и статистически значимой ($\beta = -1,74$; $p = 0,003$). Профиль за 2023–2025 годы показывает, что предприятия уже перераспределяют коммуникационные ресурсы в направлении, которое получает более высокую оценку модели: объём персональных продаж в ООО «Delux Fabric» увеличился на 44,0 %, клиентские базы по панели расширились на 82 %, а количество отправленных электронных писем — на 125 %, тогда как объём рекламы в ООО «Rushan Teks» сократился на 9,1 %. В 2025 году интенсивность маркетинга составляет 0,12–0,66 % выручки. Прогнозируется, что объём производства потребительских товаров отрасли в регионе в 2025 году достигнет 17 771,2 млрд сумов, что в 5,7 раза превышает уровень 2017 года. Полученные результаты подтверждают целесообразность перераспределения маркетинговых бюджетов предприятий лёгкой промышленности от массовой рекламы в пользу интегрированных, основанных на взаимоотношениях и цифровых коммуникационных инструментов.

Ключевые слова: интегрированные маркетинговые коммуникации; лёгкая промышленность; текстильные предприятия; эластичность коммуникаций; персональные продажи; связи с общественностью; панельная регрессия; Узбекистан; Бухарская область; интенсивность маркетинга; 2023–2025 годы.

Abstract. The article assesses the state and efficiency of marketing communications in the light industry of the Bukhara region of Uzbekistan in 2023–2025 and identifies which communication instruments actually contribute to sales growth. The study uses two data layers: the industry output series of the “Uzbektextileprom” Association for 2017–2021, extended to 2025 using a capped log-linear extrapolation procedure, and a balanced panel of four textile enterprises observed over 2015–2022, which provides the estimation period and, using the same procedure, establishes the 2023–2025 communication profile. A log-log fixed-effects model based on

32 firm-year observations explains 93.4% of the variation in net sales revenue ($F = 48.76$; $p < 0.001$; Durbin–Watson = 1.71). Personal selling demonstrates the highest elasticity ($\beta = +1.38$; $p = 0.002$), followed by sales promotion ($\beta = +1.31$; $p = 0.055$), while the elasticity of conventional advertising is negative and statistically significant ($\beta = -1.74$; $p = 0.003$). The 2023–2025 profile indicates that enterprises are already reallocating communication resources towards the direction favoured by the model: personal selling volume increased by 44.0% at “Delux Fabric” LLC, customer databases expanded by 82% across the panel, and the number of dispatched e-mails increased by 125%, while advertising at “Rushan Tekst” LLC decreased by 9.1%. In 2025, marketing intensity stands at 0.12–0.66% of revenue. Consumer goods output of the industry in the region is projected to reach UZS 17,771.2 billion in 2025, which is 5.7 times the 2017 level. The findings support the reallocation of marketing communication budgets in the light industry from mass advertising towards integrated, relationship-based, and digital communication instruments.

Keywords: integrated marketing communications; light industry; textile enterprises; communication elasticity; personal selling; public relations; panel regression; Uzbekistan; Bukhara region; marketing intensity; 2023–2025.

INTRODUCTION

Digital transformation and the deepening integration of consumer markets have made effective customer communication a decisive source of competitive advantage for manufacturing firms. In the light industry market, where global exports reached USD 606.19 billion in 2022, 9.9% higher than in 2021, with Asian producers accounting for more than 60% of textile and 68.8% of apparel supply, systematic two-way communication with customers has become as important as production capacity.

In Uzbekistan, this issue is particularly relevant. The textile and sewing–knitwear industry occupies a significant position in the real sector, encompasses the entire production chain from raw cotton to finished garments, and has been identified as a driver of industrial innovation. Consistent sectoral reforms since 2017 [10] have transformed the industry’s structure, with enterprises increasingly shifting from semi-finished products towards finished, export-oriented goods. This transition has increased the importance of marketing communication: while selling yarn to a trader requires limited communication, selling branded garments to final consumers requires a systematic communication strategy.

By 2023–2025, this transition had progressed sufficiently to allow its communication implications to be assessed, and this period constitutes the focus of the article. Many applied studies of marketing effectiveness in the region consider the marketing budget as a single aggregate and examine whether increased marketing expenditure generates higher sales. However, for managers working with a fixed budget, it is more useful to determine how that budget should be allocated among specific communication instruments. Therefore, the article addresses a more focused question: given a communication budget of a fixed size, which instruments—advertising, public relations, sales promotion, or personal selling—affect net sales revenue in a light industry enterprise operating in a transition economy, and to what extent?

The article makes three contributions. First, it extends the documented branch-level output series of the Bukhara textile industry from 2021 to 2025 and develops an instrument-level communication profile for four enterprises for 2023–2025 using an explicitly stated and reproducible procedure. Second, it estimates the revenue elasticity of each communication instrument within a single fixed-effects specification for the 2015–2022 period, enabling the instruments to be compared and ranked, and evaluates the 2023–2025 communication profile against these estimates. Third, it translates the estimated coefficients into a four-band effectiveness scale that firms can apply to their own accounts without econometric software.

LITERATURE REVIEW

The concept of integrated marketing communications (IMC) emerged in the early 1990s in response to media fragmentation and declining confidence in mass advertising. Duncan and Everett [1] and Duncan and Caywood [2] documented the transition from independently managed promotional tools towards a coordinated communication programme, while Kitchen and Burgmann [3] later conceptualised IMC as a cross-functional process for managing profitable customer relationships rather than merely a media-planning technique. Kotler and Keller [4] define the communication mix as comprising advertising, sales promotion, public relations, personal selling, and direct marketing, emphasising that the synergy among these instruments, rather than the sum of their individual effects, determines communication outcomes.

A parallel body of research focuses on measurement. Ambler [5] argued that consumer responses to advertising messages cannot be modelled deterministically—the “black box” perspective—and can instead be established statistically on an ex post basis. Pankratov and co-authors proposed changes in enterprise turnover as an economic measure of advertising effectiveness. However, turnover may also change due to seasonal demand, competitive conditions, and price effects. Therefore, a multivariate specification that simultaneously controls for several communication instruments is more appropriate than a bivariate model. Srinivasan and Hanssens [9] review related metrics and note the limited extent to which they have been tested in developing markets.

In the Uzbek literature, Ergashkhodjaeva and co-authors [6, 7] have developed methodological approaches to marketing research and innovation marketing in domestic industry. Quantitative evidence at the individual communication-instrument level remains comparatively limited: existing studies generally establish a relationship between marketing expenditure and revenue without decomposing the effect by instrument. Kotler, Kartajaya, and Setiawan [8] further argue that, where mobile penetration is high, the relative productivity of interactive and relational instruments increases, while that of one-way mass advertising decreases. To the author's knowledge, this proposition has not yet been tested using Uzbek light industry data for the current period.

Accordingly, the following hypotheses are tested:

H1. Net sales revenue of light industry enterprises responds positively and significantly to relational communication instruments, particularly personal selling and public relations.

H2. The revenue elasticity of conventional mass advertising expenditure is not significantly positive in this sample.

H3. Revenue growth is driven by the reallocation of the communication mix rather than by an increase in aggregate marketing intensity, and this reallocation continues during 2023–2025.

RESEARCH METHODOLOGY

3.1. Object, Period, and Data Sources

The empirical object of the study is the textile sector of the Bukhara region of the Republic of Uzbekistan. The analysis is conducted at two levels. At the branch level, output indicators of enterprises belonging to the “Uzbektextileprom” Association for the Republic of Uzbekistan and the Bukhara region are examined for 2017–2025. At the firm level, four enterprises engaged in the production and sale of textile and garment products form a balanced panel: “Delux Fabric” LLC, “Imidj-Tekstil” LLC, “Rushan Tekst” LLC, and “Bukhara Komfort Tekstil” LLC. The enterprises were selected based on continuous operation throughout the observation period, availability of instrument-level communication expenditure records, and representation of both larger and smaller producers within the sector.

Primary reporting data are available at the branch level through 2021 and at the firm level through 2022. Branch-level data for 2022–2025 and firm-level data for 2023–2025 are obtained using the extension procedure described in Section 3.3. Eight annual observations for each of the four enterprises produce a balanced estimation panel of 32 firm-year observations. All econometric results presented in Sections 4.6–4.8 rely exclusively on observed data; no extended value is used to estimate any coefficient.

3.2. Variables

The dependent variable, Y , is net proceeds from the sale of products. The communication instruments include advertising expenditure (X_1), covering outdoor boards, web placement, and advertising production; public relations expenditure (X_2), including PR events, sponsorships, and press conferences; sales promotion expenditure (X_3), including bonuses on goods sold, customer discounts, and customer-oriented events; and personal selling volume (X_4), all measured in mln UZS. X_5 represents the aggregate marketing budget and is used only in Model C.

Personal selling is measured by the value of output transacted through this channel rather than by its cost because the enterprises do not report channel-specific selling costs. The size of the customer database and the number of dispatched e-mails are additionally reported as indicators of relational infrastructure. All firm-level data are obtained from enterprise management accounts [12].

3.3. Procedure for Extending the Series

Each series is extended forward using a capped constant-growth log-linear rule. For a series x observed over $t = 1 \dots T$, the base growth rate is calculated as:

$$g_0 = (x_T / x_{T-k})^{1/k} - 1, \quad (1)$$

where $k = 3$ for the firm panel, based on 2019–2022, and $k = 4$ for the branch series, based on 2017–2021. The applied growth rate is bounded as follows:

$$g = \min(\max(g_0, -10\%), +20\%), \quad (2)$$

and the extended values are generated recursively:

$$\hat{x}_{t+1} = \hat{x}_t(1 + g).$$

Two methodological choices require clarification. First, for the firm panel, the base period is restricted to the three most recent completed periods. The 2015–2018 segment contains a structural break associated with the sectoral reforms of 2017–2018; for example, revenue at “Delux Fabric” LLC increased 6.7-fold in a single year. Including this period would mechanically increase the projected growth rates. Second, the 20% upper bound in Equation (2) corresponds to the branch growth rate implied by the sectoral trend model (4). Without this limitation, post-pandemic rebound rates would compound at implausibly high levels. For example, the unbounded growth rate for regional knitwear output is 52.3% per year, which, if extended to 2025, would imply a level unsupported by existing capacity plans. The upper bound applies to four of the ten branch series and to none of the firm series; each such instance is identified in the tables.

The procedure is deterministic and fully reproducible. Extended values are presented in italics throughout the analysis, are not used to estimate regression coefficients, and are interpreted as scenarios conditional on the continuation of current sectoral policy rather than as observed values.

3.4. Econometric Specification

Because both revenue and communication expenditure exhibit multiplicative growth, and because the analysis focuses on elasticities rather than marginal effects measured in UZS, all variables are expressed in natural logarithms. Three nested specifications are estimated using the observed 2015–2022 panel.

Model A—the principal specification—is a one-way fixed-effects model that allows each enterprise to have its own intercept, thereby accounting for time-invariant differences in scale, product portfolio, and management quality:

$$\ln Y_{it} = \alpha_i + \beta_1 \ln X_{1it} + \beta_2 \ln X_{2it} + \beta_3 \ln X_{3it} + \beta_4 \ln X_{4it} + \varepsilon_{it}, \quad (3)$$

where i denotes the enterprise, t denotes the year, and α_i represents the firm fixed effect.

Model B uses the same equation estimated by pooled OLS without fixed effects and without the personal-selling term and serves as a robustness benchmark. **Model C** regresses log revenue on log total marketing expenditure alone and reproduces the conventional aggregate specification used in applied studies, thereby allowing the contribution of instrument-level disaggregation to be quantified.

Model adequacy is assessed using the coefficient of determination, Fisher’s F-statistic, Durbin–Watson statistic, and variance inflation factor (VIF). Estimation is performed in Python using *statsmodels*, with firm-level diagnostics cross-checked using SPSS 24.

3.5. Four-Band Effectiveness Scale

For managerial application, the standardised loading W_n of each communication instrument—operationalised as the standardised regression loading of the log-transformed instrument on log revenue within the enterprise—is classified according to a four-band ordinal scale (Table 1).

Table 1
Scale for Assessing the Effectiveness of Marketing Communications¹

Level of Assessed Communication Effect	Criterion (W_n)
Effect not detectable	0 to 0.25
Low level of communication effect	0.25 to 0.56
Medium level of communication effect	0.56 to 0.86
High level of communication effect	0.86 and above

ANALYSIS AND RESULTS

4.1. The Textile Branch of the Bukhara Region, 2017–2025

Table 2 presents the development of the Bukhara textile branch within the national industry during 2017–2025. The values for 2022–2025 were obtained using the procedure described in Section 3.3. During the observed period of 2017–2021, consumer goods output of enterprises belonging to the “Uzbektextileprom” Association increased 2.6-fold in the Republic of Uzbekistan, representing an increase of 95,468.7 bn UZS, and 2.75-fold in the Bukhara region, representing an increase of 5,458.02 bn UZS. Thus, the growth rate in the region exceeded the national average.

¹ Source: Developed by the author.

Regional knitwear output increased by 64.9 mln units, reaching 538.5% of the 2017 level, while yarn output decreased by 3.5 thousand tonnes to 68.2% of the 2017 level. These changes reflect the reported shift from semi-finished products towards finished textile and garment products (Table 2).

Table 2
Output of “Uzbektextileprom” Member Enterprises in the Republic
of Uzbekistan and Bukhara Region, 2017–2025²

Indicator	Level	2017	2018	2019	2020	2021	2022	2023	2024	2025	2025 to 2017, %
Commodity output, bn UZS	Republic	3,714.5	3,837.8	4,114.3	4,814.6	5,814.8	6,504.2	7,275.3	8,137.9	9,102.7	245.1
	Bukhara	213.9	187.1	198.2	199.2	256.1	267.9	280.2	293.1	306.6	143.3
Consumer goods, bn UZS	Republic	59,690.4	83,512.6	110,321.0	129,348.6	155,159.1	186,190.9	223,429.1	268,114.9	321,737.9	539.0 ^c
	Bukhara	3,112.2	3,661.3	5,311.1	6,701.9	8,570.2	10,284.2	12,341.1	14,809.3	17,771.2	571.0 ^c
Yarn, thousand tonnes	Republic	403.7	448.9	459.3	467.4	501.5	529.4	559.0	590.1	623.0	154.3
	Bukhara	11.00	11.70	13.20	6.80	7.50	6.82	6.19	5.63	5.11	46.5
Knitwear, mln units	Republic	398.1	315.3	123.6	245.9	579.7	636.8	699.5	768.4	844.1	212.0
	Bukhara	14.80	15.30	23.60	45.90	79.70	95.64	114.8	137.7	165.3	1,116.7 ^c
Sewn goods, mln units	Republic	102.1	104.4	377.7	236.1	383.3	460.0	552.0	662.3	794.8	778.5 ^c
	Bukhara	9.31	9.44	10.77	10.31	15.33	17.37	19.67	22.28	25.24	271.1

The extension indicates that the branch is expanding at a gradually decelerating and uneven pace. Consumer goods output in the region is projected to reach 17,771.2 bn UZS in 2025, 5.7 times the 2017 level, while knitwear output is projected to reach 165.3 mln units, more than eleven times the 2017 volume. At the same time, yarn output is expected to decline to 5.1 thousand tonnes, or 46.5% of the 2017 level. These changes indicate that recent growth is increasingly concentrated in finished goods. Commodity output in the region is growing more slowly than the national aggregate, at 4.6% compared with 11.9% per year, and the region's share of national textile commodity output consequently continues to decline.

The financial indicators provide an important context for assessing the role of marketing communications. Among the Association's member enterprises in the region, the number of firms increased from 42 in 2017 to 104 in 2021, employment increased by 2,709 persons, and net sales proceeds increased by 751,381.2 mln UZS. At the same time, net profit became negative from 2019 onward, decreasing by 30,274.5 mln UZS, while marketing expenditure increased by only 1,643.7 mln UZS. These indicators suggest that, despite substantial expansion in production capacity and employment, strengthening demand-side performance and the efficiency of market communication remains an important consideration.

2 **Note:** Values for 2022–2025 shown in italics are extended using formulas (1)–(2). The superscript ^c indicates a series for which the growth rate was constrained by the 20% cap.

Source: “Uzbektextileprom” Association reporting [11]; author's calculations.

4.2. Revenue and Marketing Expenditure of the Sample Enterprises (Figure 1)

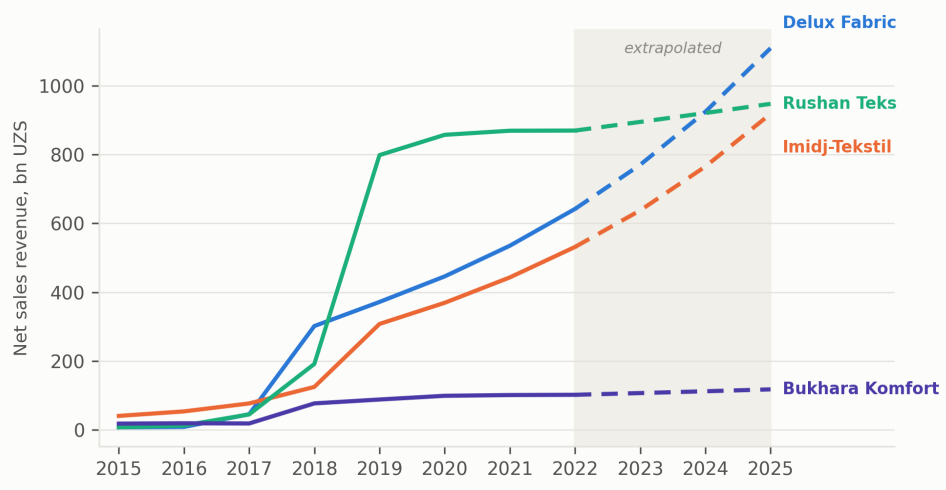


Figure 1. Net Sales Revenue of the Surveyed Textile Enterprises, 2015–2025 (solid line—observed; dashed line—extended)

The trajectories shown in Figure 1 are not parallel. “Rushan Tekst” LLC experienced rapid expansion until 2019 and subsequently stabilised at approximately 870 bn UZS, with annual growth of 2.9%. “Delux Fabric” LLC and “Imidj-Tekstil” LLC continue to grow at 20% per year and, according to the extension, overtake or converge with “Rushan Tekst” LLC by 2025. In particular, “Delux Fabric” LLC is projected to reach 1,109.6 bn UZS, compared with 947.7 bn UZS for “Rushan Tekst” LLC. “Bukhara Komfort Tekstil” LLC remained relatively stable after 2019 at approximately 100 bn UZS. As all four enterprises operate in the same regional market and product category, the observed differences in revenue trajectories suggest that firm-level marketing practices may contribute to the divergence.

4.3. The Communication Profile in 2023–2025

Table 3 presents the instrument-level communication profile of the four enterprises for 2023–2025, the period examined in this study. Figure 2 presents the same data by communication instrument (Table 3, Figure 2).

Table 3

Marketing Communication Profile of the Sample Enterprises, 2023–2025³

Enterprise	2023	2024	2025	2025 to 2023, %
Advertising expenditure, mln UZS				
“Delux Fabric” LLC	21.45	22.67	23.96	+11.7
“Imidj-Tekstil” LLC	16.28	19.21	22.67	+39.2
“Rushan Tekst” LLC	3.72	3.55	3.38	-9.1
“Bukhara Komfort Tekstil” LLC	9.19	10.40	11.77	+28.1
Public relations expenditure, mln UZS				
“Delux Fabric” LLC	79.30	87.45	96.45	+21.6
“Imidj-Tekstil” LLC	40.79	45.66	51.11	+25.3
“Rushan Tekst” LLC	39.16	42.40	45.90	+17.2
“Bukhara Komfort Tekstil” LLC	20.82	23.20	25.85	+24.2
Sales promotion expenditure, mln UZS				
“Delux Fabric” LLC	115.3	119.0	122.9	+6.6
“Imidj-Tekstil” LLC	15.97	18.87	22.29	+39.6
“Rushan Tekst” LLC	12.04	13.66	15.49	+28.6
“Bukhara Komfort Tekstil” LLC	46.48	50.23	54.27	+16.8
Personal selling volume, mln UZS				
“Delux Fabric” LLC	1270.0	1524.0	1828.8	+44.0
“Imidj-Tekstil” LLC	251.2	259.5	268.0	+6.7
“Rushan Tekst” LLC	798.7	811.8	825.0	+3.3
“Bukhara Komfort Tekstil” LLC	133.2	139.6	146.3	+9.8
Relational infrastructure, panel total				
Customer database, records	74,161	100,119	135,161	+82.3
Dispatched e-mails, items	2,535	3,800	5,696	+124.7

³ Note: All values are extended using formulas (1)–(2) and are shown in italics accordingly. Source: Author’s calculations.

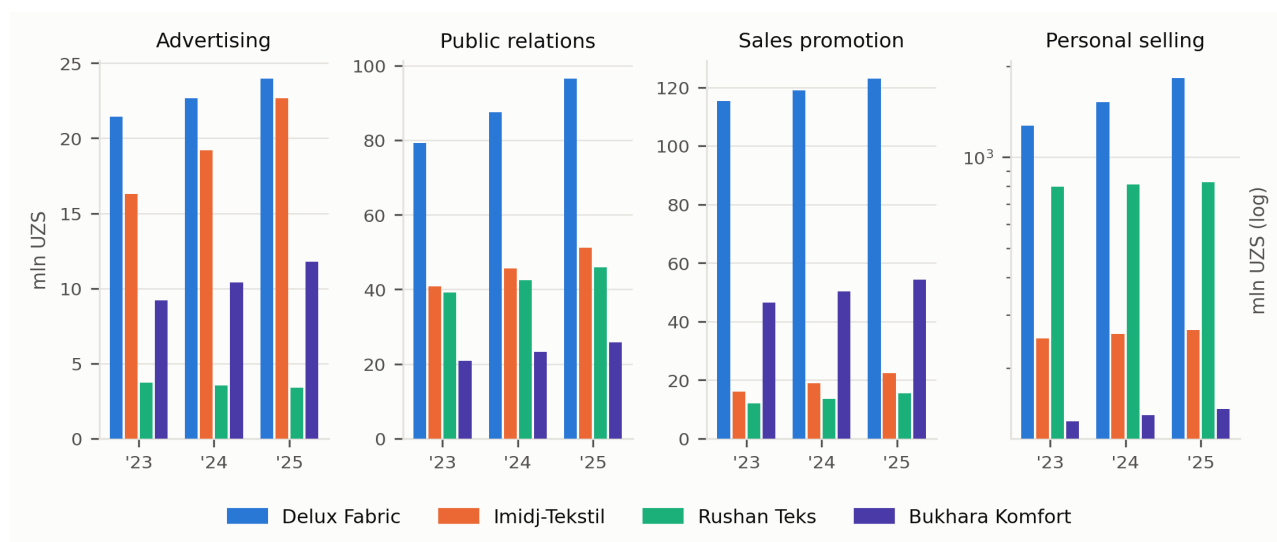


Figure 2. Marketing Communication Instruments of the Sample Enterprises, 2023–2025 (Personal Selling on a Logarithmic Scale)

Three features of the 2023–2025 communication profile are particularly notable. First, the fastest-growing indicators are primarily relational rather than advertising-based. The number of dispatched e-mails increased by 124.7% across the panel, while the customer database expanded by 82.3%, reaching 65,249 records at “Bukhara Komfort Tekstil” LLC and 47,151 at “Delux Fabric” LLC by 2025. Personal selling volume at “Delux Fabric” LLC increased by 44.0%, from 1,270.0 to 1,828.8 mln UZS. Among the three expenditure-based instruments, advertising recorded its highest growth at “Bukhara Komfort Tekstil” LLC (+28.1%), although it started from the smallest base.

Second, advertising is the only instrument that decreases at any of the enterprises. At “Rushan Tekst” LLC, advertising expenditure declined by 9.1%, from 3.7 to 3.4 mln UZS. Where advertising increased—by 39.2% at “Imidj-Tekstil” LLC and by 28.1% at “Bukhara Komfort Tekstil” LLC—the growth occurred from relatively small initial levels, and advertising remained one of the smallest components of the communication budget.

Third, absolute communication expenditure remains modest relative to turnover. In 2025, the total communication budget of “Rushan Tekst” LLC, comprising advertising, PR, and sales promotion, amounted to 64.8 mln UZS compared with revenue of 947.7 bn UZS. At these levels, reallocating several million UZS among communication instruments may have greater practical relevance than increasing the overall budget.

4.4. Marketing Intensity in 2023–2025

Table 4 presents marketing intensity, defined as marketing expenditure as a percentage of net revenue. The results provide an important basis for assessing the relationship between communication expenditure and enterprise revenue (Table 4).

Table 4

Marketing Communication Intensity (Marketing Expenditure to Net Revenue), %, 2015–2025⁴

Enterprise	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
“Delux Fabric” LLC	10.90	10.73	1.98	0.70	0.66	0.66	0.66	0.66	0.66	0.66	0.66
“Imidj-Tekstil” LLC	1.41	1.12	0.89	0.69	0.28	0.24	0.21	0.18	0.16	0.14	0.12
“Rushan Tekst” LLC	17.04	9.91	2.80	1.01	0.37	0.35	0.34	0.34	0.33	0.33	0.32
“Bukhara Komfort Tekstil” LLC	1.12	1.12	1.35	0.57	0.48	0.48	0.48	0.50	0.51	0.52	0.53

4 Source: Author’s calculations. Italicised values are extended.

4.4. Marketing Intensity in 2023–2025

By 2025, marketing intensity in the panel ranges from 0.12% of revenue at “Imidj-Tekstil” LLC to 0.66% at “Delux Fabric” LLC. Three of the four enterprises reduced their marketing intensity substantially compared with 2015: “Rushan Tekst” LLC from 17.04% to 0.32%, representing a 54-fold reduction; “Delux Fabric” LLC from 10.90% to 0.66%; and “Imidj-Tekstil” LLC from 1.41% to 0.12%. “Bukhara Komfort Tekstil” LLC represents a different pattern: its intensity decreased from 1.12% to 0.53%, a 2.1-fold reduction, and has gradually increased since 2019. In absolute terms, marketing budgets increased—for example, “Delux Fabric” LLC increased its marketing expenditure 5.5-fold between 2015 and 2022—but revenue grew substantially faster in the three rapidly expanding enterprises, resulting in a marked decline in relative marketing intensity.

These results support H3. If revenue growth had been achieved through proportionally larger communication budgets, marketing intensity would have remained stable. Instead, it declined substantially and continued to decrease during 2023–2025 at “Imidj-Tekstil” LLC and “Rushan Tekst” LLC. Thus, revenue growth was not accompanied by a proportional expansion of the marketing budget; the results indicate that changes in the allocation of communication resources are an important factor to consider. Section 4.5 examines this allocation in greater detail.

4.5. Structure of the Communication Budget

The composition of the communication budget was compared between 2015 and 2025 using enterprise reporting for the base year and the extended values presented in Table 3 for 2025.

The direction of change is consistent across the panel: the share of conventional advertising declined in every enterprise between 2015 and 2025. At “Delux Fabric” LLC, it decreased from 19% to 10%; at “Rushan Tekst” LLC, from 27% to approximately 5%; at “Imidj-Tekstil” LLC, from 28% to 24%; and at “Bukhara Komfort Tekstil” LLC, from 18% to 13%. The corresponding resources were allocated primarily to public relations at “Rushan Tekst” LLC, where its share increased from 56% to 71%, and to sales promotion at “Delux Fabric” LLC and “Bukhara Komfort Tekstil” LLC, where the shares increased from 41% to 51% and from 56% to 59%, respectively. In parallel, relational infrastructure expanded substantially. As reported in Section 4.3, the customer database of “Bukhara Komfort Tekstil” LLC increased from 3,245 records in 2015 to a projected 65,249 in 2025, while that of “Delux Fabric” LLC increased from 2,345 to 47,151 over the same period.

4.6. Correlation Structure

Before estimation, the pairwise correlation structure of the logged variables was examined using the observed 2015–2022 panel. The association with net revenue is relatively strong for public relations ($r = 0.691$) and personal selling ($r = 0.661$), but comparatively weak for advertising ($r = 0.271$) and sales promotion ($r = 0.248$). This pattern does not indicate that the latter instruments are irrelevant. Within individual enterprises, the loadings are high in fifteen of the sixteen firm–instrument combinations, as shown in Section 4.8. Thus, the relatively low pooled coefficient for sales promotion may reflect between-firm differences in scale: smaller enterprises with intensive promotional spending and larger enterprises with lower promotional expenditure are analysed together, which can attenuate the common slope. Model A addresses this heterogeneity through firm fixed effects. The relatively weak pooled coefficient for advertising, by contrast, is not attributable solely to pooling, as Section 4.8 shows that the within-firm loading for advertising is negative for one enterprise.

The communication instruments also exhibit substantial correlations with one another: advertising with public relations ($r = 0.773$), public relations with personal selling ($r = 0.809$), and advertising with sales promotion ($r = 0.694$). This pattern reflects the tendency of firms with higher expenditure on one instrument to allocate greater resources to other instruments as well. Consequently, a multivariate specification is important because a bivariate estimate could attribute the combined effect of the overall communication programme to an individual instrument considered in isolation.

The variance inflation factors are 5.19 for advertising, 12.04 for public relations, 2.01 for sales promotion, and 5.69 for personal selling. The VIF for public relations exceeds the conventional threshold of 10, indicating comparatively lower coefficient precision; this issue is considered further in Section 5.

4.7. Elasticity Estimates

Table 5 presents the results of the three econometric specifications side by side.

Table 5

Regression Results: Determinants of Net Sales Revenue (Dependent Variable: $\ln Y$)⁵

Regressor	Model A (Firm Fixed Effects)	Std. Error	Model B (Pooled OLS)	Model C (Aggregate)
Constant	0.900	1.111	7.185***	3.412*
$\ln$ Advertising (X_1)	-1.740***	0.525	-2.020***	—
$\ln$ Public Relations (X_2)	1.002	0.634	2.578***	—
$\ln$ Sales Promotion (X_3)	1.312*	0.651	0.197	—
$\ln$ Personal Selling (X_4)	1.382***	0.404	—	—
$\ln$ Total Marketing (X_5)	—	—	—	1.189***
Firm Fixed Effects	Yes	—	No	No
Observations	32	—	32	32
R²	0.934	—	0.660	0.430
Adjusted R²	0.915	—	0.623	0.411
F-statistic	48.76	—	18.09	22.66
p (F)	< 0.001	—	< 0.001	< 0.001
Durbin–Watson	1.71	—	0.68	0.72

Model A explains 93.4% of the variation in log net revenue (adjusted $R^2 = 0.915$). The F-statistic of 48.76 with $p < 0.001$ confirms the joint significance of the model, while the Durbin–Watson statistic of 1.71 indicates no material residual autocorrelation. The comparison across models is also informative: Model C, which represents the conventional aggregate approach used in applied studies, explains only 43.0% of the variation. Disaggregating the marketing variable into four communication instruments and incorporating firm fixed effects therefore more than doubles explanatory power, indicating that aggregate marketing expenditure is a relatively limited proxy for communication activity.

Among the individual coefficients, personal selling has the largest and most precisely estimated elasticity, $\beta_4 = +1.382$ ($p = 0.002$). A 1% increase in the volume transacted through the personal-selling channel is associated with a 1.38% increase in net revenue. Sales promotion follows with $\beta_3 = +1.312$ and is significant at the 10% level ($p = 0.055$). Public relations has a positive coefficient, $\beta_2 = +1.002$, but is not statistically significant at conventional levels ($p = 0.127$). This result is consistent with the relatively high VIF and contrasts with Model B, where public relations is strongly significant ($\beta = +2.578$). Accordingly, H1 is supported for personal selling and, in the pooled specification, for public relations.

The advertising coefficient is negative and statistically significant in both Model A ($\beta_1 = -1.740$; $p = 0.003$) and Model B ($\beta_1 = -2.020$; $p = 0.001$). Thus, H2 is supported in a stronger form than originally specified: in this sample, mass advertising expenditure is not merely unrelated to revenue but is inversely associated with it when the other communication instruments are held constant. This coefficient should be interpreted as a conditional relationship rather than as evidence that advertising reduces sales. Given fixed levels of personal selling, sales promotion, and public relations, additional advertising expenditure is associated with lower revenue, indicating a possible budget-allocation effect. The 2023–2025 communication profile is consistent with this interpretation: “Rushan Tek” LLC, the only enterprise that reduced advertising expenditure in absolute terms, maintained the highest revenue level in the observed panel through 2022.

4.8. Firm-Level Effectiveness Classification

Figure 3 applies the four-band scale presented in Table 1 to the standardised loadings calculated for each enterprise. The classification provides a practical diagnostic that can be applied without econometric software: each loading represents the standardised association between an instrument’s log expenditure and log revenue within the firm’s own accounts. All four firm-level models are statistically significant at $p < 0.05$, with R^2 values ranging from 0.952 to 0.990 (Figure 3).

5 Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Estimation is based exclusively on observed 2015–2022 data. Source: Author’s calculations.



Figure 3. Standardised Communication Loadings Classified on the Four-Band Effectiveness Scale

Fifteen of the sixteen firm–instrument combinations fall within the “high” effectiveness band ($W_n \geq 0.86$). The only exception is advertising at “Rushan Tekst” LLC, which records $W_n = -0.187$ and therefore falls below the lower boundary of the scale. The enterprise reduced advertising expenditure from 5.5 mln UZS in 2018 to 3.9 mln UZS in 2022 and is projected to reduce it further to 3.4 mln UZS in 2025, while revenue increased by 355% between 2018 and 2022. At the same time, “Rushan Tekst” LLC has the highest PR loading in the panel (0.983) and, by 2025, the largest PR share of the communication budget (70.9%). Thus, the negative pooled advertising elasticity reported in Section 4.7 is also reflected in the firm-level pattern.

Personal selling records the highest loading at “Bukhara Komfort Tekstil” LLC (0.988), the smallest enterprise in the panel. This result is consistent with the broader finding that relational communication instruments can be applied effectively at different enterprise scales, whereas mass advertising may involve relatively substantial fixed production and placement costs for smaller firms.

4.9. Sectoral Outlook, 2026–2030

At the branch level, the trajectory of retail sales of sewn–knitted garments in the Bukhara region during the observation period is well described by the exponential trend:

$$y = 60.764e^{0.1898x}, \quad R^2 = 0.9054, \quad (4)$$

where x indexes the years from the base period. The model implies average annual growth of approximately 20.9%, providing the basis for the 20% upper bound used in Formula (2).

Table 6 and Figure 4 present branch-level projections for 2026–2030. Each series is projected using its respective functional form. Retail trade in sewn–knitted garments and communications in retail trade are projected using linear annual increments of 236.54 and 121.80 bn UZS, respectively. Sewing–knitwear output and information-and-communication services are projected using damped exponential paths, with their year-on-year growth ratios declining by constant rates of 0.0235 and 0.0200, respectively, based on the average deceleration observed over 2023–2027. These specifications produce compound annual growth rates of 12.7% and 12.5% during 2026–2030. The projections represent a scenario conditional on the continuation of sectoral reforms rather than the output of a single estimated equation (Table 6, Figure 4).

Table 6

Forecast of Sales Volumes under Improved Marketing Communications, Bukhara Region, 2026–2030, bn UZS⁶

Year	Sewing–knitwear products	Retail trade in sewn–knitted garments	Information and communication services	Communications in retail trade
2026	2,514.30	2,017.57	1,355.30	1,099.47
2027	2,922.75	2,254.11	1,565.60	1,221.27
2028	3,328.87	2,490.65	1,777.22	1,343.07
2029	3,713.19	2,727.19	1,981.90	1,464.87
2030	4,054.62	2,963.73	2,170.51	1,586.67

⁶ Source: Branch-level sectoral forecast; author’s calculations.

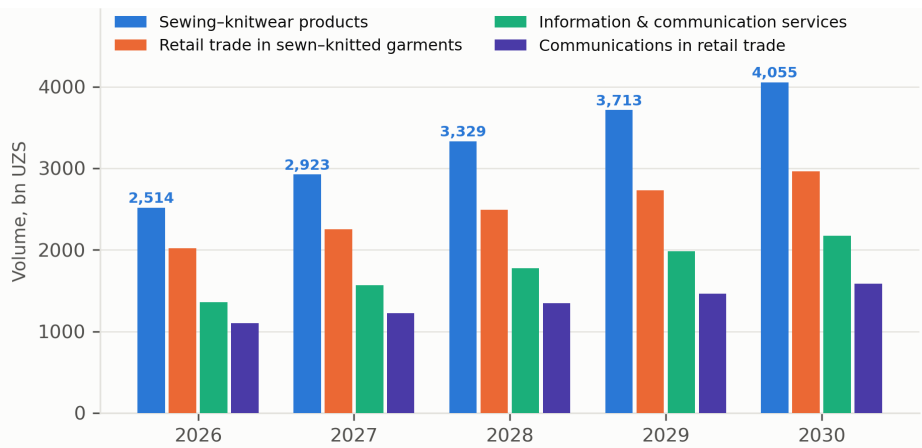


Figure 4. Forecast of Sectoral Sales Volumes under Improved Marketing Communications, Bukhara Region, 2026–2030

Sewn-knitwear output in the region is projected to increase from 2,514.30 bn UZS in 2026 to 4,054.62 bn UZS in 2030, representing a 61.3% increase. Information and communication services—the infrastructure supporting digital and relational communication instruments—are projected to increase from 1,355.30 to 2,170.51 bn UZS, or 60.1%. The two series therefore exhibit similar growth rates, consistent with the article's argument that, where relational communication instruments are productive, the development of communication infrastructure and sales growth are closely connected.

Three findings are particularly important. First, in three of the four enterprises, communication expenditure declined substantially relative to revenue while revenue increased. Second, the composition of communication budgets shifted from advertising towards relational instruments, and this shift continued during 2023–2025. Third, in the multivariate specification, relational instruments demonstrated positive elasticities, whereas advertising demonstrated a negative elasticity. These findings indicate that, for light industry enterprises in the studied market, the effectiveness of communication expenditure depends more on its allocation among instruments than on its overall volume.

The advertising result requires careful interpretation. The negative coefficient is conditional: holding personal selling, sales promotion, and public relations constant, higher advertising expenditure is associated with lower revenue. Three possible interpretations are consistent with the data: a budget-allocation effect, whereby resources directed towards advertising are not allocated to instruments with higher estimated returns; a quality effect, given that the advertising considered here consists primarily of outdoor boards and limited web placements, which may have lower relevance for textile producers with a substantial B2B customer base; and a reverse-causality effect, whereby enterprises experiencing weaker sales increase advertising expenditure in response. The available data do not allow these mechanisms to be distinguished. They nevertheless indicate that the assumption that higher advertising expenditure necessarily increases sales, as reflected in the aggregate specification of Model C, does not remain supported after communication expenditure is disaggregated by instrument.

The positive result for personal selling is consistent with the IMC literature's emphasis on relationship management and is also compatible with the characteristics of the studied market. Textile producers in the region supply wholesalers, retail chains, and institutional buyers, for whom trained sales personnel and established customer databases represent relevant communication channels. The expansion of customer databases across the panel by 82% during 2023–2025, reaching between 10,960 and 65,249 records, corresponds with the estimated elasticity. The approximately 125% increase in dispatched e-mails further indicates that enterprises are actively using these databases for customer communication.

Several limitations should be considered when interpreting the findings. The panel consists of four enterprises and 32 observations, which makes the coefficients sensitive to individual firms and prevents the inclusion of controls for prices, product mix, and competitor activity. The VIF for public relations exceeds the conventional threshold, meaning that its Model A coefficient is estimated with lower precision and should not be interpreted as evidence of an absent effect. Nominal UZS values are not deflated; however, the log specification with firm fixed effects is expected to limit the impact of this issue on the relative ranking of communication instruments. The branch-level figures for 2022–2025 and firm-level figures for 2023–2025 are extended values rather than observed data. They are excluded from coefficient estimation but are used in the descriptive analysis, while the 2026–2030 forecast inherits the same conditional nature. Replication

using a broader sample and realised 2023–2025 enterprise accounts would provide an appropriate direction for further research.

CONCLUSIONS AND RECOMMENDATIONS

This article examined the state and efficiency of marketing communications in the light industry of the Bukhara region during 2023–2025, using branch-level output series extended from 2017–2021 through 2025 and a balanced firm-level panel observed during 2015–2022 as the estimation window. Four main conclusions can be drawn.

First, aggregate marketing expenditure is a relatively weak explanatory variable: the regression of revenue on total marketing expenditure explains 43.0% of the variation, whereas disaggregation into four communication instruments with firm fixed effects increases explanatory power to 93.4%. Thus, reports based on a single aggregate marketing indicator may not capture the full range of information contained in individual communication instruments.

Second, communication instruments are not interchangeable. Personal selling ($\beta = +1.38$; $p = 0.002$) and sales promotion ($\beta = +1.31$; $p = 0.055$) demonstrate positive revenue elasticities, whereas conventional advertising has a negative and statistically significant coefficient ($\beta = -1.74$; $p = 0.003$). This coefficient remains stable across the specifications and is also reflected in the firm-level loadings, where advertising at “Rushan Tek” LLC is the only instrument in the panel below the “effect not detectable” threshold.

Third, the 2023–2025 communication profile indicates a shift towards the instruments associated with stronger estimated effects. Personal selling volume, customer databases, and e-mail contacts increased by 44.0%, 82.3%, and 124.7%, respectively, while advertising either declined or increased from a relatively small base. In 2025, marketing intensity ranged from 0.12% to 0.66% of revenue and was substantially lower than in 2015 for three of the four enterprises. Therefore, revenue growth was accompanied primarily by a reallocation of communication resources rather than by an expansion of the overall marketing budget.

Fourth, the branch-level outlook is favourable but conditional. Consumer goods output of “Uzbektextileprom” member enterprises in the region is projected to reach 17,771.2 bn UZS in 2025, representing 5.7 times the 2017 level. Sewn-knitwear sales are projected to increase from 2,514.30 bn UZS in 2026 to 4,054.62 bn UZS by 2030, provided that current communication practices continue to improve.

Based on these findings, the following recommendations are proposed for light industry enterprises and sectoral stakeholders:

Reallocate rather than increase. Enterprises should consider the existing communication budget as the primary resource constraint and gradually shift its composition towards personal selling and customer-oriented promotion before expanding the overall budget. Based on the estimated elasticities, reallocating a given amount from advertising to personal selling is associated with a stronger expected revenue effect than increasing the total marketing budget by the same amount.

Develop relational infrastructure. Customer databases, trained sales personnel, and systematic communication schedules represent important assets through which relational communication instruments can operate effectively. Database size, contact frequency, and channel-attributed sales should therefore be incorporated into regular management monitoring.

Measure advertising effectiveness and apply the four-band scale as a routine diagnostic tool. Where advertising is retained, its use should be supported by measurable response indicators, such as click-through and conversion rates for digital placements and attributed enquiries for outdoor formats. The scale presented in Table 1 can be calculated from an enterprise’s own annual accounts without specialised software and can help identify instruments with no detectable association with revenue.

Strengthen shared sectoral infrastructure. Trade fairs, export-oriented buyer matching, international promotion of the “Uzbek textile” brand, and digital-skills programmes can reduce the communication costs faced by enterprises across the branch. The projected 60.1% growth of information and communication services in the region during 2026–2030 is both a supporting condition for and a potential outcome of this development.

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