Utilizing ANOVA to Evaluate Creative Economy Product Marketing: Insights from the School Data Board

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Abstract

CV. Samudra Karya Sejahtera is the sole entity in the Pringsewu Regency, Lampung Province, specializing in convection and printing, and also serves as a distributor of school data boards for various educational levels. This study aims to employ analysis of variance (ANOVA), forecasting analysis, and multiple regression analysis to assist CV. SKS in sales planning, inventory management, resource allocation, and strategic decision-making. Conducted from January 10 to February 10, 2024, this quantitative research evaluates the relationships between variables, tests hypotheses, and generates generalizations using primary data obtained from the company. The ANOVA results indicate that sales performance across the marketing areas of Pringsewu, Pesawaran, Tanggamus, and Lampung Tengah is uniformly profitable. Regression analysis reveals that the price variable does not significantly impact sales of creative economy products. However, both price and promotional cost variables together explain 88.1% of the variance in school data board sales. The multiple regression model is expressed as $Y = -167{,}8 + 0{,}001X_1 + 0{,}0003X_2$, where X_1 represents the price and X_2 denotes promotional costs. Forecasting using the model $\hat{Y} = 359{,}1 + 31{,}1X$ predicts a sales volume of 639 units for 2024.

Keywords: forecasting; anova; strategies; marketing; creative economy

Introduction

The creative economy is a pivotal subsector for Indonesia's national development due to its significant economic impact. The creative economy as a key driver of economic growth, job creation, trade, and innovation. The culinary subsector alone contributed an average of 56.09% to the creative economy between 2010 and 2013 (Hidayat & Asmara, 2017; Hilmi et al., 2020; Nugroho, 2018). Moreover, the sector constitutes 7% of Indonesia's GDP, employs 11.8 million individuals (10.72% of the national workforce), and has established 5.4 million businesses, contributing IDR 119 trillion (5.72%) to national exports. Globally, Indonesia's creative economy ranks third in GDP contribution, following the United States and South Korea, with significant contributions from culinary (41%), fashion (17%), and crafts (14.9%) (Nugroho, 2018).

The rapid development of digital technologies has further fueled the creative economy. Digital resources such as e-commerce, fintech, and IoT have transformed the distribution and consumption of creative products (Kwon & Kim, 2014; Lee & Ungson, 2008). Projections indicate that e-commerce transactions grew by 1,625% to USD 130 billion between 2013 and 2020. Ernst & Young's 2015 global creative economy mapping valued the creative sector at USD 2.3 trillion, equating to 3% of the global GDP (Lightfoot, 2011). As Indonesia aims to become a leading high-income economy by 2030, the creative economy is anticipated to play a crucial role, reflecting its increasing share in national GDP.

The evolution of Indonesia's creative economy began with the Indonesian Cultural Products Week in 2007 and was bolstered by Presidential Instruction Number 6 of 2009, marking a significant policy shift towards promoting economic creativity (Nugroho, 2018; Sidauruk et al., 2019). Despite producing relatively small quantities, the creative industry's GDP contribution averaged 6.3% from 2002 to 2006 and employed 5.4 million

workers (Markusen et al., 2008). The sector also demonstrated robust export performance, accounting for 10.6% of total exports during the same period. The Creative Economy Development Convention (2009-2015) highlighted the sector's economic contributions, positive business climate, and ability to foster innovation and national identity (Saleh, 2022; Zevaya et al., 2022).

Recent data illustrate consistent growth in the creative economy's added value. By 2015, the sector's GDP contribution increased to 7.38%, with 5.4 million creative businesses employing 10.72% of the workforce (Bujor & Avsilcai, 2016; Hidayat & Asmara, 2017). The productivity of creative industry workers significantly surpasses that of several manufacturing sectors, underscoring the sector's high value addition. Key contributing sectors—culinary, fashion, crafts, and publishing-printing—highlight the substantial economic value generated (Bujor & Avsilcai, 2016; Müller et al., 2009; Varotsis, 2022).

The creative economy's growth is paralleled by increasing complexity in its product markets. Unique and innovative creative products require precise forecasting to optimize sales and marketing strategies. Factors such as fashion trends, consumer preferences, and seasonal influences impact demand, necessitating sophisticated forecasting methods (Beheshti-Kashi et al., 2015; F. Liu et al., 2013; Nenni et al., 2013; Thomassey, 2010). Effective marketing of creative products depends on strong branding, creativity, and consumer experience (Beheshti-Kashi et al., 2015; N. Liu et al., 2013; Nenni et al., 2013).

CV. Samudra Karya Sejahtera, operating in the convection and printing sector, exemplifies a business leveraging creative economy principles. By integrating forecasting analysis, the company can enhance production planning, inventory management, and marketing strategies, thereby improving operational efficiency and business performance (Lin, 2023; Sung, 2015).

Previous research on the creative economy has highlighted various aspects of its development. Fatkhurahman (2020) examined factors influencing the culinary sector's growth, while Khoo & Badarulzaman (2014) explored the transformation of slum areas into culinary tourism spots, Prasetyawan et al. (2019) focused on culinary business development. This research introduces a novel perspective by evaluating marketing strategies for creative economy products in the printing sector, specifically school data boards, through forecasting, variance analysis, and multiple regression analysis. This approach addresses a gap in understanding marketing strategies for creative products within this specific sector (Barusman & Ferdinan, 2019).

Methodology

This study employs a quantitative research approach, utilizing statistical methods to analyze data and uncover relationships between variables (Diawara et al., 2021). The research incorporates forecasting analysis, variance analysis, and multiple regression analysis to provide comprehensive insights (Pai et al., 2018). Quantitative research is characterized by its systematic approach to collecting, analyzing, and interpreting numerical data. (Habiburrahman et al., 2022). This method aims to measure variable relationships, test hypotheses, and generalize findings based on empirical evidence (Mertler, 2020; Panjaitan, 2018; Wu & Little, 2011).

The research was conducted at CV. Samudra Karya Sejahtera from January 10 to February 10, 2024. During this period, primary data was collected, specifically focusing on sales data spanning from 2007 to 2023. This data, provided by the company's manager, serves as the basis for the statistical analyses performed in the study.

Results and Discussion
School Data Board Sales Forecasting at CV. Samudra Karya Sejahtera
CV. Samudra Karya Sejahtera specializes in the sale of school data boards and has maintained comprehensive sales records from 2007 to 2023. Analyzing this data will provide insights into sales trends and support forecasting efforts. The data, listed below, details annual sales figures which will be used to project future sales and understand historical patterns. The forecast model employs a trend equation of the form $Y = \alpha + \beta x$, where Y represents the trend value, X denotes the period, α is the constant, and β) is the coefficient (slope) of X.

Table 3. School Data Board Sales from 2007-2023

Year	Sale
2007	128
2008	134
2009	174
2010	203
2011	211
2012	317
2013	287
2014	298
2015	364
2016	352
2017	413
2018	465
2019	503
2020	511
2021	572
2022	593
2023	580

The table above presents the annual sales figures for school data boards at CV. Samudra Karya Sejahtera from 2007 to 2023. To analyze these sales trends, we will use a linear trend forecasting model. The equation $Y = \alpha + \beta x$ will be applied to estimate future sales based on historical data. In this equation, α represents the constant term, β signifies the slope or rate of change, and X is the period (year). The calculation will involve determining the values of α and X using statistical methods to best fit the historical sales data, providing a reliable basis for forecasting future sales.

Table 4. Table of Calculation School Data Board Sales Trends 2007-2023

Year	Y	X	$X \cdot Y$	X^2
2007	128	-8	-1024	64
2008	134	-7	-938	49
2009	174	-6	-1044	36
2010	203	-5	-1015	25
2011	211	-4	-844	16
2012	317	-3	-951	9

Year				
2013	287	-2	-574	4
2014	298	-1	-298	1
2015	364	0	0	0
2016	352	1	352	1
2017	413	2	826	4
2018	465	3	1395	9
2019	503	4	2012	16
2020	511	5	2555	25
2021	572	6	3432	36
2022	593	7	4151	49
2023	580	8	4640	64
Amount	6,105	0	12,675	408

Constant value α

$$\alpha = \frac{\sum Y}{n} = \frac{6,105}{17} = 359.1176$$

Coefficient value β

$$\beta = \frac{\sum XY}{\sum X^2} = \frac{12,675}{408} = 31.06618$$

Thus, the similarity in sales trends for CV. Samudra Karya Sejahtera school data boards. from 2007-2023 is

$$Y = 359.1 + 31.1X$$

From this equation, the trend value for each year can be determined as follows:

$Y_{2007} = 359.1 + 31.1(-8) = 110.3$
$Y_{2008} = 359.1 + 31.1(-7) = 141.4$
$\vdots$
$Y_{2023} = 359.1 + 31.1(8) = 607.9$
$Y_{2024} = 359.1 + 31.1(9) = 639$

So, the forecast for sales of school data boards in 2024 is 639 data boards.

Regression Analysis of School Data Board Sales at CV. Samudra Karya Sejahtera 2007 – 2023

CV. Samudra Karya Sejahtera as a distributor agent for school data boards in three marketing areas, Pringsewu Regency, Pesawaran Regency, Tanggamus Regency, and Lampung Tengah Regency has sales data, promotional costs, and prices for school data boards from 2007 to 2023 as follows:

Table 5. Sales Data, Promotion Costs, and Prices for CV. Samudra Karya Sejahtera School Data Boards
from 2007-2023

Year	Sale (Y)	Price (X_1)	Promotion Costs (X_2)
2007	128	IDR 375,000	IDR 1,000,000
2008	134	IDR 375,000	IDR 1,000,000
2009	174	IDR 375,000	IDR 1,000,000
2010	203	IDR 375,000	IDR 1,000,000
2011	211	IDR 375,000	IDR 1,000,000
2012	317	IDR 375,000	IDR 1,500,000
2013	287	IDR 375,000	IDR 1,500,000

2014	298	IDR 425,000	IDR 1,500,000
2015	364	IDR 425,000	IDR 2,000,000
2016	352	IDR 425,000	IDR 2,000,000
2017	413	IDR 475,000	IDR 2,000,000
2018	465	IDR 475,000	IDR 2,000,000
2019	503	IDR 475,000	IDR 3,000,000
2020	511	IDR 550,000	IDR 3,000,000
2021	572	IDR 550,000	IDR 3,000,000
2022	593	IDR 550,000	IDR 3,000,000
2023	580	IDR 550,000	IDR 3,000,000

The equation will be determined $Y = \alpha + \beta_1 X_1 + \beta_2 X_2$ where
Y = trend value
X_1 = price of school data board products
X_2 = promotional costs
α = constant
β_1 = coefficient X_1
β_2 = coefficient X_2

Table 6. Calculation Table for School Data Board Sales Trends 2007-2023

n	Y	X_1	X_2	X_1^2	X_2^2	Y^2	$X_1 \cdot Y$	$X_2 \cdot Y$	$X_1 \cdot X_2$
2007	128	$375 \cdot 10^3$	$1 \cdot 10^6$	$140{,}625 \cdot 10^6$	$1 \cdot 10^{12}$	16384	$4.8 \cdot 10^7$	$1.28 \cdot 10^8$	$3.75 \cdot 10^{11}$
2008	134	$375 \cdot 10^3$	$1 \cdot 10^6$	$140{,}625 \cdot 10^6$	$1 \cdot 10^{12}$	17956	$5{,}025 \cdot 10^7$	$1.34 \cdot 10^8$	$3.75 \cdot 10^{11}$
2009	174	$375 \cdot 10^3$	$1 \cdot 10^6$	$140{,}625 \cdot 10^6$	$1 \cdot 10^{12}$	30276	$6{,}525 \cdot 10^7$	$1.74 \cdot 10^8$	$3.75 \cdot 10^{11}$
2010	203	$375 \cdot 10^3$	$1 \cdot 10^6$	$140{,}625 \cdot 10^6$	$1 \cdot 10^{12}$	41209	$7.6125 \cdot 10^7$	$2.03 \cdot 10^8$	$3.75 \cdot 10^{11}$
2011	211	$375 \cdot 10^3$	$1 \cdot 10^6$	$140{,}625 \cdot 10^6$	$1 \cdot 10^{12}$	44521	$7.9125 \cdot 10^7$	$2.11 \cdot 10^8$	$3.75 \cdot 10^{11}$
2012	317	$375 \cdot 10^3$	$1 \cdot 10^6$	$140{,}625 \cdot 10^6$	$2{,}250 \cdot 10^{12}$	100489	$1.18875 \cdot 10^7$	$4{,}755 \cdot 10^8$	$5{,}625 \cdot 10^{11}$
2013	287	$375 \cdot 10^3$	$1 \cdot 10^6$	$140{,}625 \cdot 10^6$	$2{,}250 \cdot 10^{12}$	82369	$1.07625 \cdot 10^7$	$4{,}305 \cdot 10^8$	$5{,}625 \cdot 10^{11}$
2014	298	$425 \cdot 10^3$	$1 \cdot 10^6$	$180{,}625 \cdot 10^6$	$2{,}250 \cdot 10^{12}$	88804	$1.2665 \cdot 10^7$	$4.47 \cdot 10^8$	$6{,}375 \cdot 10^{11}$
2015	364	$425 \cdot 10^3$	$2 \cdot 10^6$	$180{,}625 \cdot 10^6$	$4 \cdot 10^{12}$	132496	$1{,}547 \cdot 10^7$	$7.28 \cdot 10^8$	$8.5 \cdot 10^{11}$
2016	352	$425 \cdot 10^3$	$2 \cdot 10^6$	$180{,}625 \cdot 10^6$	$4 \cdot 10^{12}$	123904	$1{,}496 \cdot 10^7$	$7.04 \cdot 10^8$	$8.5 \cdot 10^{11}$
2017	413	$475 \cdot 10^3$	$2 \cdot 10^6$	$225{,}625 \cdot 10^6$	$4 \cdot 10^{12}$	170569	$1.96175 \cdot 10^7$	$8.26 \cdot 10^8$	$9.5 \cdot 10^{11}$
2018	465	$475 \cdot 10^3$	$2 \cdot 10^6$	$225{,}625 \cdot 10^6$	$4 \cdot 10^{12}$	216225	$2.20875 \cdot 10^7$	$9.3 \cdot 10^8$	$9.5 \cdot 10^{11}$
2019	503	$475 \cdot 10^3$	$3 \cdot 10^6$	$225{,}625 \cdot 10^6$	$9 \cdot 10^{12}$	253009	$2.38925 \cdot 10^7$	$1{,}509 \cdot 10^8$	$1{,}425 \cdot 10^{11}$

		550·10^3	3·10^6	302,500·10^6	9·10^{12}		2.8105·10^7	1,533·10^8	
2020	51 1	550·10^3	3·10^6	302,500·10^6	9·10^{12}	26112 1	2.8105·10^7	1,533·10^8	1.65·10^{11}
2021	57 2	550·10^3	3·10^6	302,500·10^6	9·10^{12}	32718 4	3,146·10^7	1,716·10^8	1.65·10^{11}
2022	59 3	550·10^3	3·10^6	302,500·10^6	9·10^{12}	35164 9	3.2615·10^7	1,779·10^8	1.65·10^{11}
2023	58 0	550·10^3	3·10^6	302,500·10^6	9·10^{12}	33640 0	3.19·10^7	1.74·10^8	1.65·10^{11}
Amount	6.1 05	7,525·10^3	32.5·10^6	3,413,12 5·10^6	72,75 0·10^{12}	2,594, 565	2.872975·10^7	13,668·10^9	1.52625·10^{12}

1) Determine the values of α, β_1, and β_2 for the regression equation $Y = \alpha + \beta_1 X_1 + \beta_2 X_2$

$$\sum x_1^2 = \sum X_1^2 - \frac{(\sum X_1)^2}{n} = 3.413.125.000.000 - \frac{7.525.000^2}{17} = 82.205.882.352,94$$

$$\sum x_2^2 = \sum X_2^2 - \frac{(\sum X_2)^2}{n} = 72.750.000.000.000 - \frac{32.500.000^2}{17}$$
$$= 10.617.647.058.823,50$$

$$\sum x_1 x_2 = \sum X_1 X_2 - \frac{\sum X_1 \sum X_2}{n} = 15.262.500.000.000 - \frac{7.525.000 \cdot 32.500.000}{17}$$
$$= 876.470.588.235,30$$

$$\sum x_1 y = \sum X_1 Y - \frac{\sum X_1 \sum Y}{n} = 2.872.975.000 - \frac{7.525.000 \cdot 6.105}{17} = 170.614.705,88$$

$$\sum x_2 y = \sum X_2 Y - \frac{\sum X_2 \sum Y}{n} = 13.668.000.000 - \frac{32.500.000 \cdot 6.105}{17}$$
$$= 1.996.676.470,59$$

$$\sum y^2 = \sum Y^2 - \frac{(\sum Y)^2}{n} = 2.594.565 - \frac{6.105^2}{17} = 402.151,76$$

$$\beta_1 = \frac{(\sum X_2^2)(\sum x_1 Y) - (\sum x_2 y)(\sum x_1 x_2)}{(\sum x_1^2)(\sum X_2^2) - (\sum x_1 x_2)^2} = 0{,}001278782$$

$$\beta_2 = \frac{(\sum X_1^2)(\sum x_2 Y) - (\sum x_1 y)(\sum x_1 x_2)}{(\sum x_1^2)(\sum X_2^2) - (\sum x_1 x_2)^2} = 0{,}00033575$$

$$\alpha = \frac{\sum Y - \beta_1 \sum X_1 - \beta_2 \sum X_2}{n}$$
$$= -167{,}808$$

Thus, the multiple linear regression equation of price and promotion variables on CV school data board sales. Samudra Karya Sejahtera from 2007 to 2023 is
$$Y = -167{,}808 + 0{,}001278782 X_1 + 0{,}00033575 X_2$$

The value $\alpha = -167,808$ can be interpreted if, without price variables and promotional costs, the sales level would decrease by 168 school data board units. The value $\beta_1 = 0,001278782$ can be interpreted, if the price variable increases 100% then the sales level will remain constant. The value $\beta_2 = 0,00033575$can be interpreted, if the promotional cost variable increases by 100% then the sales level will increase by 1 unit.

2) Calculating the coefficient of determination R^2

$$R^2 = \frac{(\beta_1 \cdot \sum x_1 y) + (\beta_2 \cdot \sum x_2 y)}{\sum y^2}$$

$$= 0,881$$

$$R = 0,938$$

Thus, it can be interpreted that the correlation between price variables and promotional costs on school data board sales is 0.938, which means there is a very strong correlation. For the coefficient of determination, the R^2 result obtained is 0.881, or 88.1% of the variation in school data board sales variables can be explained by the price and promotional costs variables while the remainder, or 11.9% is explained by other variables. In other words, the price variable and promotional costs contribute to the school data board sales variable by 88.1%.

3) Model testing uses F-test

Testing the hypothesis of the feasibility of a multiple regression model between price variables and promotional costs on school data board sales using the analysis of variance (ANOVA) method as follows:

i. Statistical hypothesis:
    H_0 = price variables and promotional costs influence school data board sales
    H_1 = price variables and promotional costs do not affect on school data board sales

ii. Level of significance:
    $\alpha = 0.05$

iii. Calculation of test statistics:
    Calculating JKR (Sum of Regression Squares)

$$JKR = \left(\beta_1 \cdot \sum x_1 y\right) + \left(\beta_2 \cdot \sum x_2 y\right)$$

$$= 378.884,622$$

Calculating JKG (Sum of Error Squares)

$$JKG = \sum (Y - \hat{Y})^2 = 23.267,142$$

The results of these calculations are summarized in the following ANOVA table.

Table 7. ANOVA Table

Source of variation	Sum of squares	Degrees of freedom	Squared mean	F_{calc}
X(regression)	378.884,622	2	189,442,311	113,989
Error	23.267,142	14	1,661,939	
Total	402,151,765	16		

Thus the value is $F_{calc} = 113.989$ while $F_{table} = F_{0,05;(2,14)} = 3.74$.
Based on F_{calc} and F_{table}

- If $F_{calc} > F_{table}$ then the independent variable influences the dependent variable.
- If $F_{calc} < F_{table}$ then the independent variable does not affect the dependent variable.

Based on the calculation results, 113.989 > 3.74 or $F_{calc} > F_{table}$ so there is a significant influence of the price variables and promotional costs on school data board sales.

iv. Conclusion

Based on hypothesis testing, it can be concluded that there is a significant influence of price variables and promotional costs on school data board sales so the regression equation model is suitable for use.

4) Partial model testing uses a t-test

Testing the partial multiple regression model hypothesis between the price variable on data board sales and the promotion cost variable on school data board sales using the t-test as follows:

i. Statistical hypothesis:

H_0 = price variable influences the sales of school data boards

H_1 = price variable does not affect on school data board sales

ii. Level of significance:

$\alpha = 0.05$

iii. Calculation of test statistics:

First, determine the standard error for the regression equation X_1, the standard error for the coefficient, and the standard error for the coefficient X_2 as follows:

Regression standard error

$$S_e = \sqrt{\frac{\sum Y^2 - (\alpha \cdot \sum Y) - (\beta_1 \cdot \sum X_1 Y) - (\beta_2 \cdot \sum X_2 Y)}{N - (k + 1)}}$$

$= 0,096$

Standard errors for coefficients X_1

$$S_{\beta_1} = \frac{S_e}{\sqrt{\sum X_1^2 - nX_1^2(1 - R)^2}} = 0,0008936$$

Standard errors for coefficients X_1

$$S_{\beta_2} = \frac{S_e}{\sqrt{\sum X_2^2 - nX_2^2(1 - R)^2}} = 0,0000870$$

The value t_{calc} for variable X_1

$$t_{calc} = \frac{\beta_1}{S_{\beta_1}} = 1,431$$

Thus, the value t_{calc} is 1.431 while $t_{table} = t_{0,05;(14)} = 1.761$.

Based on the calculation results, 1.431 < 1.761 or $t_{calc} < t_{table}$ it can be concluded that the price variable has no significant effect on school data board sales.

The value t_{calc} for variable X_2

$$t_{calc} = \frac{\beta_2}{S_{\beta_2}} = 3,861$$

Thus, the value $t_{hitung} = 3.861$ while $t_{tabel} = t_{0,05;(14)} = 1.761$.

Based on the calculation results, 3.861 > 1.761 or $t_{calc} > t_{table}$. It can be concluded that the promotional cost variable has a significant effect on school data board sales.

iv. Conclusion

Based on the results of the hypothesis test, it was concluded that partially the price variable had no significant effect on the school data board sales variable but partially the promotion cost variable had a significant effect on CV. Samudra Karya Sejahtera' school data board sales.

Sales of School Data Boards (Creative Economy Products) CV. Samudra Karya Sejahtera from 2007 – 2023 in Pringsewu, Lampung Tengah, Pesawaran, and Tanggamus Regency

Table 8. School Data Board Creative Economy Product Sales Data in Four Regencies

Year	Regency				Amount
	Pringsewu	Lampung Tengah	Pesawaran	Tanggamus	
2007	38	42	20	28	128
2008	48	20	33	33	134
2009	68	52	34	20	174
2010	56	47	61	39	203
2011	72	36	73	30	211
2012	82	61	106	68	317
2013	78	80	70	59	287
2014	76	114	50	58	298
2015	104	108	69	83	364
2016	108	98	74	72	352
2017	134	122	68	89	413
2018	128	136	100	101	465
2019	164	139	102	98	503
2020	135	176	85	115	511
2021	119	153	150	150	572
2022	202	191	85	115	593
2023	182	198	100	100	580
Amount	1,794	1,773	1,280	1,258	6.105
Average	105.53	104.30	75.30	74.00	359.12

Source: CV. SKS Marketing Staff

The total sales of creative economy products for school data boards in Pringsewu Regency are expressed as $t_1 = 1.794$, total sales in Lampung Tengah Regency are expressed as $t_2 = 1.773$, total sales in Pesawaran Regency are expressed as $t_3 = 1.280$, while total sales in Tanggamus Regency are expressed as $t_4 = 1.258$. Hypothesis testing is there a difference in profit from selling creative economy products on school data boards in Pringsewu Regency, Lampung Tengah Regency, Pesawaran Regency, and Tanggamus Regency using the Analysis of Variance method.

1) Assumption:
- The population of sales of creative economy products on school data boards in Pringsewu Regency, Lampung Tengah Regency, Pesawaran Regency, and Tanggamus Regency is normally distributed.

- The population selling creative economy products on school data boards in Pringsewu Regency, Lampung Tengah Regency, Pesawaran Regency, and Tanggamus Regency is homogeneous ($\sigma_1^2 = \sigma_2^2 = \sigma_3^2 = \sigma_4^2$)

2) Statistical hypothesis:

H_0 =There is no difference in profit from selling creative economy products from school data boards in Pringsewu Regency, Lampung Tengah Regency, Pesawaran Regency, and Tanggamus Regency

H_1 =At least there is a difference in profit from selling creative economy products from school data boards between Pringsewu Regency, Lampung Tengah Regency, Pesawaran Regency, and Tanggamus Regency

3) Level of significance:

$\alpha = 0.05$

4) Calculation of test statistics:

RY expresses the sum of squares originating from the average:

$$RY = \frac{J^2}{\sum_{i=1}^{4} n_i} = \frac{(1.794 + 1.773 + 1.280 + 1.258)^2}{(17 + 17 + 17 + 17)} = \frac{6.105^2}{68} = 548.103,31$$

AY expresses the sum of squares that originates from variations between groups:

$$AY = \sum_{i=1}^{4} \left(\frac{J_i^2}{n_i}\right) - RY = \left(\frac{1.794^2}{17} + \frac{1.773^2}{17} + \frac{1.280^2}{17} + \frac{1.258^2}{17}\right) - 548.103,31$$
$$= 15.598,40$$

$\sum Y^2$ states the squared sum of all sales in Pringsewu Regency, Lampung Tengah Regency, Pesawaran Regency, and Tanggamus Regency.

$$\sum Y^2 = 38^2 + 48^2 + \cdots + 115^2 + 100^2 = 688.293$$

DY expresses the sum of squares that originates from within-group variation:

$$DY = \sum Y^2 - RY - AY = 688.293 - 548.103,31 - 15.598,40 = 124.591,29$$

Obtained ANOVA table as follows:

Source of variation	et al	JK	RJK	F
Average	1	$RY = 548.103,31$	548,103.31	2.67
Between groups	3	$AY = 15.598,40$	5,199.47	
In Group	64	$DY = 124.591,29$	1,946.74	
Total	68			

Thus, $F_{calc} = 2.67$.

5) Calculation of degrees of freedom:

The degrees of freedom v_1 are formulated as $v_1 = k - 1$ where k is the number of groups of observations. In this case, $k = 4$ it stated product sales in Pringsewu Regency, Lampung Tengah Regency, Pesawaran Regency, and Tanggamus Regency. Thus, it is obtained,

$$v_1 = k - 1 = 4 - 1 = 3.$$

The degree of freedom v_2 is formulated as $v_2 = n_1 + n_2 + n_3 + n_4 - k$ stating the number of observations of sales of creative economy products on school data boards in Pringsewu Regency during $2007 - 2023$; n_2 stating the number of observations of sales of creative economy products on school data boards in Central Lampung Regency during $2007 - 2023$; n_3 stating the number of observations of sales of creative economy products on school data boards in Pesawaran Regency during 2007

– 2023; and n_4 stating the number of observations of sales of creative economy products on school data boards in Tanggamus Regency during 2007 – 2023.

Thus, we obtain $v_2 = n_1 + n_2 + n_3 + n_4 - k = 17 + 17 + 17 + 17 - 4 = 64$. Thus, $F_{table} = F_{(0,95)(3,64)} = 2{,}75$.

6) Decision:

The hypothesis is rejected if $F_{calc} > F_{table} = F_{(0,95)(3,64)}$. The calculation results obtained $F_{calc} = 2{,}67$ while $F_{table} = F_{(0,95)(3,64)} = 2{,}75$. Because $2{,}67 < 2{,}75$ then accept H_0.

Discussion

The sales data of school data boards at CV. Samudra Karya Sejahtera from 2007 to 2023 highlights a clear upward trend, indicating the company's growth and the increasing demand for these products. The application of a linear trend forecasting model yielded the equation $Y = 359.1 + 31.1X$. This model projects sales to continue increasing, with an estimated 639 units for 2024. The consistent rise in sales underscores the effectiveness of the company's strategies and the growing recognition and reliance on school data boards within the educational sector. The forecasting model provides a reliable basis for planning future production and marketing strategies, allowing the company to meet anticipated demand efficiently (Hidayat & Asmara, 2017; Hilmi et al., 2020; Nugroho, 2018).

The multiple linear regression analysis revealed the significant impact of promotional costs on sales, while price changes showed no significant effect. The regression equation $Y = -167.808 + 0.001278782X_1 + 0.00033575X_2$ illustrates this relationship. The high coefficient of determination $R^2 = 0.881$ indicates that 88.1% of the variation in sales can be explained by the combined influence of price and promotional costs, highlighting the importance of effective promotional strategies. The strong correlation (R = 0.938) between these variables and sales further supports the critical role of marketing investments in driving sales performance. The F-test results corroborate the regression analysis, showing that the model is statistically significant ($F_{\text{calc}} = 113.989$ vs. $F_{\text{table}} = 3.74$). This confirms that promotional costs and pricing together significantly affect sales, with promotional costs being the more influential factor. These findings suggest that CV. Samudra Karya Sejahtera should prioritize promotional activities to enhance sales further (Kwon & Kim, 2014; Lee & Ungson, 2008).

The sales data across four regencies—Pringsewu, Lampung Tengah, Pesawaran, and Tanggamus—showed no significant difference in profit margins, as indicated by the ANOVA results ($F_{\text{calc}} = 2.67$ vs. $F_{\text{table}} = 2.75$). This homogeneity suggests that the marketing strategies employed by CV. Samudra Karya Sejahtera are equally effective across these regions. It also implies that external factors influencing sales, such as market size, economic conditions, and consumer behavior, are relatively similar in these regencies. However, while the overall sales and profits are comparable, there may still be regional differences in consumer preferences and competitive landscapes that were not captured in this analysis. Further qualitative research could provide deeper insights into regional market dynamics and inform more tailored marketing strategies (Bujor & Avsilcai, 2016; Hidayat & Asmara, 2017).

The significant impact of promotional costs on sales highlights the need for continued and possibly increased investment in marketing and promotional activities. CV. Samudra Karya Sejahtera should explore various promotional strategies, including digital marketing, community engagement, and partnerships with educational

institutions, to maintain and boost sales. Since price changes did not significantly affect sales, the company might consider maintaining stable pricing while focusing on value addition and customer engagement to enhance market loyalty and customer satisfaction. While the current analysis indicates no significant regional differences in sales, CV. Samudra Karya Sejahtera should consider conducting further qualitative research to uncover any nuanced regional preferences and competitive factors. Tailoring marketing strategies to these insights could optimize sales performance in each regency (Beheshti-Kashi et al., 2015; F. Liu et al., 2013; Nenni et al., 2013; Thomassey, 2010).

The linear trend model suggests a continued increase in sales, providing a reliable basis for future planning. The company should leverage this forecast to optimize production planning, inventory management, and resource allocation to meet anticipated demand efficiently. Overall, the analysis underscores the robust growth trajectory of CV. Samudra Karya Sejahtera's school data board sales and the critical role of promotional activities in driving this growth. While pricing changes have a lesser impact, maintaining stable prices alongside aggressive promotional strategies will likely yield the best results. The homogeneity in regional sales performance suggests effective overarching strategies, but further tailored approaches could enhance market penetration. These insights provide a strategic roadmap for sustaining and accelerating growth in the coming years (Fatkhurahman et al., 2020; Khoo & Badarulzaman, 2014; Prasetyawan et al., 2019).

Conclusion

The forecasting analysis and correlation study reveal that product pricing significantly affects the sales of school data boards at CV. Samudra Karya Sejahtera. An increase in product prices, all other factors being equal, tends to result in a decrease in sales as consumers may find the higher cost prohibitive. Conversely, a decrease in prices generally leads to increased sales due to enhanced affordability. Thus, strategic price adjustments are crucial for boosting sales of creative economy products. In addition to pricing, promotional activities play a key role in driving sales. Effective promotional strategies, including advertising, discounts, and other marketing campaigns, significantly impact consumer behavior and demand. Well-executed promotions raise consumer awareness, incentivize purchases, and can lead to higher sales volumes by encouraging quicker or larger-scale buying. To ensure the sustainability and growth of CV. Samudra Karya Sejahtera, it is recommended to focus on both pricing strategies and promotional efforts. Analyzing market demands and pricing trends, offering attractive discounts or special deals, conducting effective promotional campaigns through both print and digital media, and leveraging technology and social media to broaden promotional reach are essential. Additionally, ongoing evaluation of sales performance and consumer feedback regarding promotions will provide insights for continuous improvement. By adopting these strategies, the company can enhance product appeal, drive sales growth, and strengthen its market position.

References

Barusman, M. Y. S., & Ferdinan, F. (2019). Sales Structure Strategy in Bumiputera Muda LLC 1967 General Insurance Branch Lampung, Indonesia. *Journal of Marketing and Consumer Research*, *54*, 88–96. https://doi.org/10.7176/JMCR

Beheshti-Kashi, S., Karimi, H. R., Thoben, K.-D., Lütjen, M., & Teucke, M. (2015). A survey on retail sales forecasting and prediction in fashion markets. *Systems*

Science & Control Engineering, *3*(1), 154–161. https://doi.org/10.1080/21642583.2014.999389

Bujor, A., & Avsilcai, S. (2016). Modern technologies and business performance in creative industries: a framework of analysis. *IOP Conference Series: Materials Science and Engineering*, *145*(6), 062001. https://doi.org/10.1088/1757-899X/145/6/062001

Diawara, N., Ferguson, S., Grant, M., & Das, K. (2021). Novel statistical analysis in the context of a comprehensive needs assessment for secondary stem recruitment. *Computation*, *9*(10). https://doi.org/10.3390/computation9100105

Fatkhurahman, Hadiyati, & Suroto, B. (2020). Creativity and Opportunity on Traditional Food Products: Business quality in competitive environment. *IOP Conference Series: Earth and Environmental Science*, *469*(1), 012066. https://doi.org/10.1088/1755-1315/469/1/012066

Habiburrahman, H., Prasetyo, A., Raharjo, T. W., Rinawati, H. S., Trisnani, Eko, B. R., Wahyudiyono, Wulandari, S. N., Fahlevi, M., Aljuaid, M., & Heidler, P. (2022). Determination of Critical Factors for Success in Business Incubators and Startups in East Java. *Sustainability (Switzerland)*, *14*(21), 1–17. https://doi.org/10.3390/su142114243

Hidayat, A. R. R. T., & Asmara, A. Y. (2017). Creative industry in supporting economy growth in Indonesia: Perspective of regional innovation system. *IOP Conference Series: Earth and Environmental Science*, *70*(1), 012031. https://doi.org/10.1088/1755-1315/70/1/012031

Hilmi, H., Puspitawati, L., & Utari, R. (2020). Pengaruh Kompetisi, Pertumbuhan Laba dan Kinerja Lingkungan terhadap Pengungkapan Informasi Emisi Karbon pada Perusahaan. *Owner : Riset Dan Jurnal Akuntansi*, *4*(2), 296–307. https://doi.org/https://doi.org/10.33395/owner.v4i2.232

Khoo, S. L., & Badarulzaman, N. (2014). Factors Determining George Town as a City of Gastronomy. *Tourism Planning & Development*, *11*(4), 371–386. https://doi.org/10.1080/21568316.2013.874365

Kwon, S.-H., & Kim, J. (2014). The cultural industry policies of the Korean government and the Korean Wave. *International Journal of Cultural Policy*, *20*(4), 422–439. https://doi.org/10.1080/10286632.2013.829052

Lee, S.-M., & Ungson, G. R. (2008). Towards a theory of synchronous technological assimilation: The case of Korea's Internet economy. *Journal of World Business*, *43*(3), 274–289. https://doi.org/https://doi.org/10.1016/j.jwb.2008.03.009

Lin, A. C. H. (2023). Emerging Key Elements of a Business Model for Sustaining the Cultural and Creative Industries in the Post-Pandemic Era. *Sustainability (Switzerland)*, *15*(11). https://doi.org/10.3390/su15118903

Liu, F., Hu, L., & Gan, J. (2013). A study on the learning style preferences with different academic backgrounds-taking Tujia EFL learners as examples. *Theory and Practice in Language Studies*, *3*(1), 100–107. https://doi.org/10.4304/tpls.3.1.100-107

Liu, N., Ren, S., Choi, T.-M., Hui, C.-L., & Ng, S.-F. (2013). Sales Forecasting for Fashion Retailing Service Industry: A Review. *Mathematical Problems in Engineering*, *2013*(1), 738675. https://doi.org/https://doi.org/10.1155/2013/738675

Markusen, A., Wassall, G. H., DeNatale, D., & Cohen, R. (2008). Defining the Creative Economy: Industry and Occupational Approaches. *Economic Development Quarterly*, *22*(1), 24–45. https://doi.org/10.1177/0891242407311862

Mertler, C. A. (2020). Quantitative Methodology in Adolescent Research. In *The Encyclopedia of Child and Adolescent Development* (pp. 1–14). https://doi.org/https://doi.org/10.1002/9781119171492.wecad313

Müller, K., Rammer, C., & Trüby, J. (2009). The role of creative industries in industrial innovation. *Innovation*, *11*(2), 148–168. https://doi.org/10.5172/impp.11.2.148

Nenni, M. E., Giustiniano, L., & Pirolo, L. (2013). Demand Forecasting in the Fashion Industry: A Review. *International Journal of Engineering Business Management*, *5*, 37. https://doi.org/10.5772/56840

Nugroho, P. (2018). A Socio-spatial Dimension of Local Creative Industry Development in Semarang and Kudus Batik Clusters. *IOP Conference Series: Earth and Environmental Science*, *123*(1), 012040. https://doi.org/10.1088/1755-1315/123/1/012040

Pai, P.-F., Hong, L.-C., & Lin, K.-P. (2018). Using Internet Search Trends and Historical Trading Data for Predicting Stock Markets by the Least Squares Support Vector Regression Model. *Computational Intelligence and Neuroscience*, *2018*(1), 6305246. https://doi.org/https://doi.org/10.1155/2018/6305246

Panjaitan, R. L. (2018). Choosing appropriate independent variable in educational experimental research: some errors debunked. *Journal of Physics: Conference Series*, *983*(1), 012133. https://doi.org/10.1088/1742-6596/983/1/012133

Prasetyawan, Y., Suef, M., Supriyanto, H., & Wardani, I. O. K. (2019). Empowering product development through creative culinary house design. *IOP Conference Series: Materials Science and Engineering*, *528*(1), 012025. https://doi.org/10.1088/1757-899X/528/1/012025

Saleh, R. (2022). Creative Economy Development Toward Stability of National Economy (Indonesia). *Journal Research of Social, Science, Economics, and Management*, *1*(7), 809–817. https://doi.org/10.36418/jrssem.v1i7.110

Sidauruk, R., Apriani, T., & Hamudy, M. (2019). Achievement, Obstacles, and Challenges in the Development of Creative Economy's Best Product in the City of Bandung and Badung District. *Jurnal Bina Praja*, 87–97. https://doi.org/10.21787/jbp.11.2019.87-97

Sung, T. K. (2015). Application of information technology in creative economy: Manufacturing vs. creative industries. *Technological Forecasting and Social Change*, *96*, 111–120. https://doi.org/https://doi.org/10.1016/j.techfore.2015.04.002

Thomassey, S. (2010). Sales forecasts in clothing industry: The key success factor of the supply chain management. *International Journal of Production Economics*, *128*(2), 470–483. https://doi.org/https://doi.org/10.1016/j.ijpe.2010.07.018

Varotsis, N. (2022). Digital Entrepreneurship and Creative Industries in Tourism: A Research Agenda. In *Economies* (Vol. 10, Number 7). MDPI. https://doi.org/10.3390/economies10070167

Wu, W., & Little, T. D. (2011). Quantitative Research Methods. In B. B. Brown & M. J. Prinstein (Eds.), *Encyclopedia of Adolescence* (pp. 287–297). Academic Press. https://doi.org/https://doi.org/10.1016/B978-0-12-373951-3.00034-X

Zevaya, F., Putri, R., Asrori, K., Fitria, M., Asfahani, F. R., & Afrianita, S. (2022). A Portrait of the Creative Economy Sub-Sector in the Growth Triangle Area. *International Journal of Asian Social Science*, *12*(12), 520–529. https://doi.org/10.55493/5007.v12i12.4688