



# **Role of Data Visualization in Finance**

**Presentation of Scholarly Article**

**IFSC 54503 Data Visualization**

**Submitted by – Deepak Singla**

**Submitted to - Prof. Mihail Tudoreanu**



# Agenda

1. About article
2. Abstract and Research Gap
3. Importance of visualization in Finance
4. Risk Management & Visualization
5. Technical and Analytical Applications
6. Walmart Case Study: Income Statement Trends
7. Balance and Cashflow
8. Executive compensation and Ownership
9. Merits of the article
10. Areas of improvement
11. Conclusion



## Article

Name : Role of Data Visualization in Finance

Authors :

1. Md. Kamrul Hasan Chy, University of Central Arkansas, Conway TX
2. Obed Nana Buadi, University of Texas at El Paso, El Paso, TX

Source :

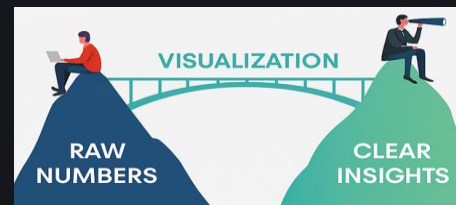
<https://www.scirp.org/journal/paperinformation?paperid=127201>

Published : American Journal of Industrial and Business Management, Vol. 13 No. 8, August 2021



# Abstract and Research Gap

- Finance lags behind other fields in adopting visualization tools.
- Financial data is complex and often inaccessible to non-experts.
- Research gap: Limited studies on visualization in 10-Ks & proxy statements.
- Study aim: Demonstrate how visuals (charts, dashboards) improve comprehension.
- Value: Saves time, improves accessibility, attracts wider stakeholder engagement.








Walmart Inc. Form 10-K For the Fiscal Year Ended January 31, 2023	
Table of Contents	
	Page
Part I	
Item 1 Business	6
Item 1A Risk Factors	11
Item 1B Unresolved Staff Comments	12
Item 2 Properties	28
Item 3 Legal Proceedings	21
Item 4 Mine Safety Disclosures	22
Part II	
Item 5 Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities	23
Item 6 Reserves	25
Item 7 Management's Discussion and Analysis of Financial Condition and Results of Operations	26
Item 8 Quantitative and Qualitative Disclosures About Market Risk	48
Item 9 Financial Statements and Supplementary Data	50
Item 10 Changes in and Dispositions of Significant Investments and Financial Disclosures	51
Item 11 Controls and Procedures	51
Item 12 Other Information	51
Item 13 Disclosure Regarding Foreign Jurisdictions that Prevent Inspections	51
Part III	
Item 14 Directors, Executive Officers and Corporate Governance	52
Item 15 Executive Compensation	52
Item 16 Security: Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	52
Item 17 Certain Relationships and Related Transactions, and Director Independence	52
Item 18 Financial Accounting Policies and Practices	52
Part IV	
Item 19 Exhibits, Financial Statement Schedules	53
Item 20 Form 10-K Summary	53
Item 21 Signature	56

Walmart Inc. Consolidated Cash Flow Statement						
2023 in millions						
	12 months ended:	Jan 31, 2023	Jan 31, 2022	Jan 31, 2021	Jan 31, 2020	Jan 31, 2019
Consolidated net income		11,792	13,529	13,700	13,293	13,513
Depreciation and amortization		10,945	10,818	11,151	10,987	10,878
Net unrealized and realized gains and losses		1,083	2,640	(1,888)	(1,488)	8,334
Losses on disposal of business operations		—	433	8,401	8,402	—
Acquisition of businesses		849	(276)	1,912	300	(499)
Loss on extinguishment of debt		1,027	2,410	1,257	1,254	1,136
Other operating activities		1,020	1,052	1,251	1,251	1,210
Receivables, net		240	(1,794)	(1,088)	114	(1,074)
Accounts payable		(1,475)	5,320	8,904	(774)	4,086
Accrued liabilities		6,281	2,404	6,623	188	188
Net change in operating assets and liabilities		(777)	78	(188)	576	(577)
Changes in certain assets and liabilities, net of effects of acquisitions and dispositions		2,565	(26,795)	3,975	(187)	295
Adjustments to reconcile consolidated net income to net cash provided by operating activities		17,549	10,241	25,368	10,004	20,574
Net cash provided by operating activities		29,341	24,141	26,074	20,258	27,759
Payments for property and equipment		(16,873)	(13,529)	(15,700)	(15,700)	(15,700)
Proceeds from the disposal of property and equipment		276	84	211	81	81
Proceeds from disposal of certain operations, net of disposed cash		1,700	7,835	58	873	876
Payments for the acquisition of businesses, net of cash acquired		(242)	(209)	(100)	(50)	(14,008)
Other investing activities		(292)	(879)	(102)	479	(451)
Net cash used in investing activities		(17,722)	(16,432)	(16,072)	(15,186)	(14,498)
Proceeds from issuance of long-term debt		5,061	8,263	(124)	(4,404)	13,749
Net change in short-term borrowings		—	—	—	—	—
Payments of long-term debt		(1,090)	(1,000)	(1,392)	(1,392)	(1,392)
Payments and receipts for foreign debt		26,141	(2,117)	(2,117)	(2,117)	(2,117)
Dividends paid		(6,000)	(6,000)	(6,000)	(6,000)	(6,000)
Purchase of company stock		(9,000)	(9,787)	(12,431)	(12,431)	(12,431)
Dividends paid to noncontrolling interest		(844)	(914)	(914)	(914)	(914)
Purchase of noncontrolling interest		(827)	—	—	—	—
Settlement of subsidiary stock		—	3,239	140	52	—
Other financing activities		(1,138)	(1,138)	(1,138)	(1,138)	(1,138)
Net cash used in financing activities		(17,088)	(17,088)	(16,113)	(16,499)	(16,499)
Effect of exchange rates on cash, cash equivalents and restricted cash		(73)	(140)	235	(85)	(140)
Net increase (decrease) in cash, cash equivalents and restricted cash		(5,099)	(5,099)	10,141	1,709	742
Change in cash and cash equivalents restricted from this source held for sale		—	1,848	(1,848)	—	—
Cash, cash equivalents and restricted cash at beginning of year		14,834	17,738	9,515	7,738	7,014
Cash, cash equivalents and restricted cash at end of year		9,735	14,834	17,738	9,515	7,738

Source: <https://www.stock-analysis-on.net/NYSE/Company/Walmart-Inc/Financial-Statement/Statement-of-Cash-Flows>



# Importance of Data Visualization

-  Regulatory Encouragement: SEC promotes graphical disclosures in 10-Ks to improve clarity.
-  Bridging Experts & Non-Experts: Makes financial data accessible to shareholders, employees, and the public.
-  Trend & Risk Detection: Identifies anomalies, correlations, and emerging risks quickly.
- Efficiency & Speed: Saves time by turning raw numbers into actionable insights.
-  Forecasting & Scenario Planning: Visual models improve accuracy of financial projections.
-  Decision-Making Power: Enables real-time, data-driven decisions in dynamic markets.



# Risk Management & Visualization

🔥 Risk Identification: Heatmaps & tree maps highlight areas of high exposure.

🏦 Banking Applications: Dashboards assess loan approval risks in real time

📊 Portfolio Management: Visual benchmarking compares performance across portfolios.


🌐 Multi-level Analysis: Risk can be viewed at market, portfolio, or single-asset level.


⚖️ Decision Support: Helps allocate resources to prioritized risk mitigation strategies.


Key takeaway : Enables faster response to emerging threats.





# Technical and Analytical Applications


 **Forecasting Models:** Visual tools help project future cash flows, revenues, and expenses.


 **Capital Budgeting:** NPV and IRR profiles visualized for quick project evaluation.

 **Anomaly Detection:** Charts and dashboards flag unusual transactions or outliers.

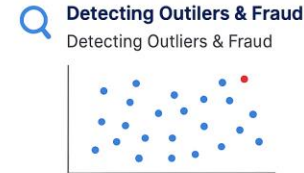
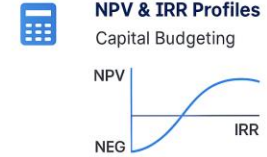
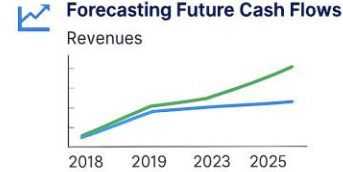
 **Scenario & Sensitivity Analysis:** Visual simulations show impact of changing assumptions.

 **Benchmarking:** Compare portfolio or firm performance against peers or indices.

 **Key Insight:** Visualization enhances accuracy, transparency, and speed in financial analysis

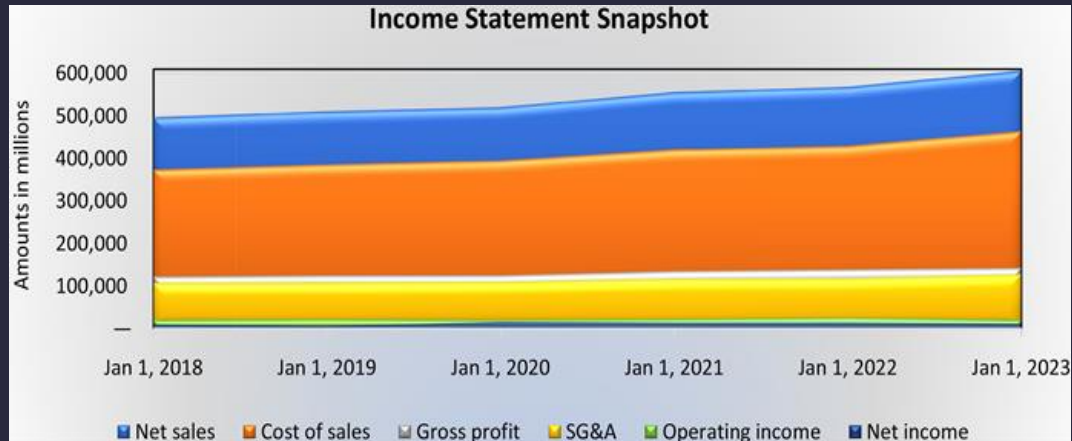
 Visualization are widely used in stock charts analysis

## Technical and Analytical Applications




# Walmart Case Study (Income Statement Trends)


- 📈 Consistent Sales Growth: Net sales rose steadily from 2018 to 2023.
- 💡 Pandemic Resilience: Sales and profits increased even during COVID-19 disruptions.
- 💰 Stable Cost Structure: Cost of sales tracked closely with revenue, maintaining margins.
- 📊 SG&A Expenses: Noticeable increase in 2023, pressuring operating income.
- ✅ Profitability: Net income grew overall, with only a slight dip in 2023.
- 🔍 Key Insight: Visualization highlights resilience and cost management but also flags rising expenses.








# Balance and Cash Flow

 **Strong Asset Base:** Long-term assets consistently exceeded liabilities.

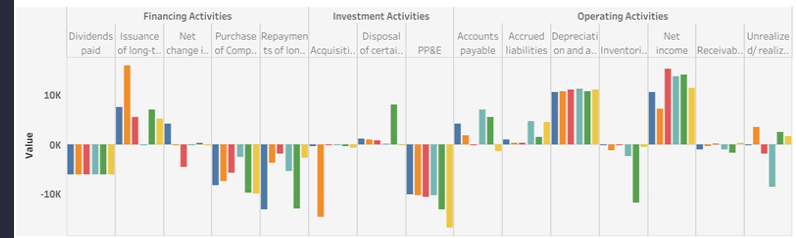
 **Low Long-Term Debt:** Debt levels remained manageable relative to assets.

 **Working Capital:** Cash balances roughly matched accounts payable—healthy liquidity.

 **Cash Flow Strength:** Operating cash flows consistently positive, funding investments & debt repayment.

 **Key Insight:** Walmart's balance sheet shows resilience and strong liquidity management.

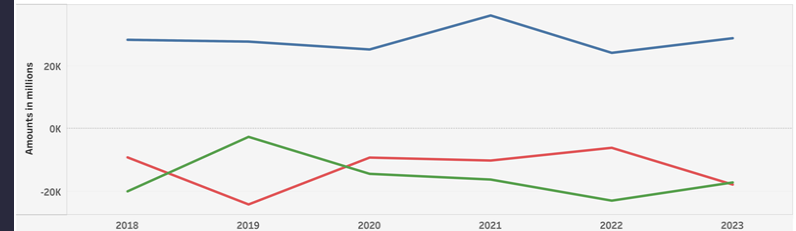
Source and Use of Cash by Type of Activities



Measure Names

Jan 31, 2018 Jan 31, 2019 Jan 31, 2020 Jan 31, 2021 Jan 31, 2022 Jan 31, 2023

Cash Flow Activities



Measure Names

Net cash provided by operating activities Net cash used in financing activities Net cash used in investing activities



# Executive Compensation and Ownership



Performance-Linked Pay: Majority of executive compensation tied to stock performance.



Alignment with Shareholders: Executives benefit when company performs well.



Insider Ownership: Directors & executives hold ~47% of shares.



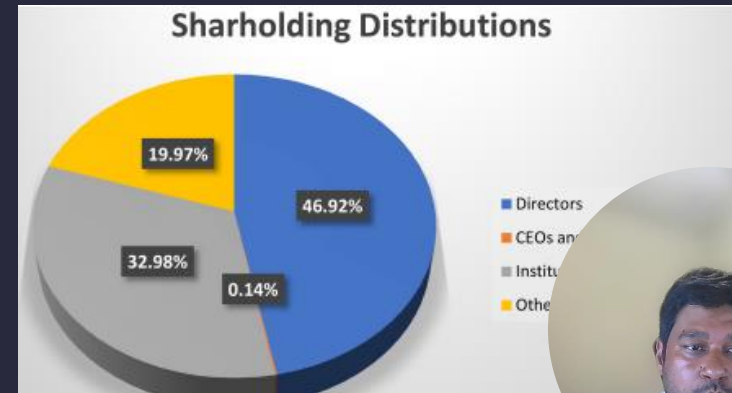
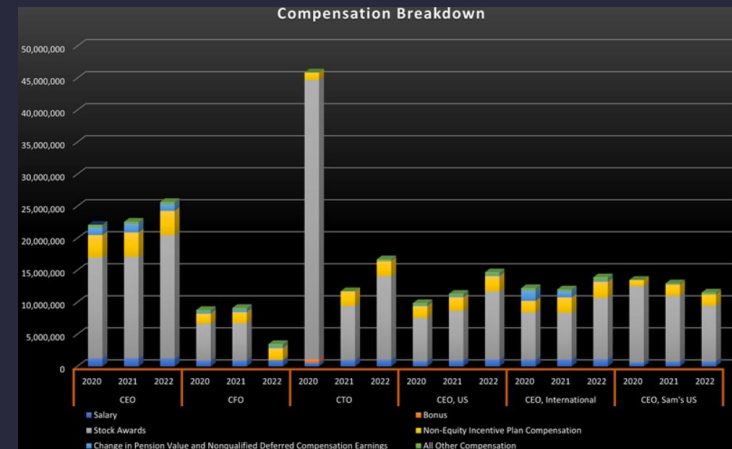
Institutional Investors: Significant stake held by funds and asset managers



Public Shareholders: Remaining shares widely distributed.



Key Insight: High insider ownership aligns management with shareholder interests.



## Merits of the Article

- Fills Research Gap: Addresses lack of studies on visualization in finance, especially in 10-Ks & proxy statements.
- Practical Case Study: Uses Walmart's financials (2018–2023) to demonstrate real-world application.
- Accessibility: Highlights how visuals make financial data understandable for non-experts.
- Comprehensive Coverage: Discusses visualization in reporting, risk management, forecasting, and executive compensation.
- Action-Oriented: Provides clear recommendations for firms and regulators.



# Areas of Improvement

- Limited Scope: Focuses mainly on Walmart; broader industry comparisons would strengthen findings.
- Visualization Depth: Relies on basic charts; could explore advanced tools (interactive dashboards, AI-driven visuals).
- Visualization Depth: More depth analysis on how visualization can be applied to fraud detection and suspicious activities
- Global Perspective: Primarily U.S.-focused; international examples would add value.
- User Testing: Lacks empirical evidence on how non-experts interpret visuals compared to raw data.
- Future Research: Could explore real-time visualization in financial decision-making.



# Conclusion

To conclude I would say that financial data visualization transforms complex disclosures into accessible insights. By applying tools like heatmaps, dashboards, and ratio charts, firms can enhance transparency, improve decision-making and align stakeholders.

Walmart's case study illustrates both the merits and limitations, highlighting visualization's growing role in modern financial reporting and governance.

