



## Consumer Preferences for HP printers

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### ABSTRACT

The Digital Age has brought forth a quick transformation that has fundamentally changed consumer expectations, human behavior, and social connections. As a result, consumers are increasingly seen as the primary decision-maker and purchasing behavior has changed. Consumer opinions and preferences must be well understood since emotional ties to brands have grown essential. The printer market is the subject of this study because it is a dynamic industry affected by shifting consumer preferences and advances in technology. This study tries to determine the elements impacting consumers' decisions when buying HP printers, a significant player in the market. Global issues included in the study include supply chain dynamics, consumer preferences, time-to-market issues, and aspirations for personalization, the resurgence of the era, safeguarding trademarks, and the sustainability of the environment. It analyses the responses received to determine the factors influencing a person's decision to buy an HP printer using factor analysis and multiple linear regression analysis in SPSS software. Three primary variables are identified by the research: affordable and readily availability of ink cartridges; cost-effectiveness and printing efficiency; and integrated performance and user experience. The findings reveal that only two factors, Integrated performance and user experience (Factor 1) and Ink cartridge availability and affordability (Factor 3), significantly impact consumer preferences for HP printers. The research reveals the significant influence of various factors on consumer preferences for HP printers, with a modest explanatory power of 9.5%. This understanding can help HP tailor its product development and marketing strategies to succeed in the competitive printer market, thereby enhancing its competitive edge.

Keywords: HP printer, consumer preference, factors, regression analysis

### INTRODUCTION

A printer is a hardcopy peripheral that can create human-readable representations of graphics or text on paper or other physical media. A printer in general is regarded as an external hardware device which generates a hard copy of electronic data that is stored on a computer or any other electronic device. The hard copy generated by this device is tangible in nature. The data stored in electronic devices may take up the form of documents, texts, photos or a combination of these. Printers come to use when one needs to print texts and images. A printer with good quality becomes an essential office equipment in certain firms. The market for printing concerns have undergone various changes. The demand has seen a surge due to new technology, varying needs of consumers and new market emergence.

In 2020, there were 94.36 million [hardcopy peripheral units shipped worldwide](#), including printers, copiers, and multifunctional systems. While printers are now mostly used in computing and information technology, recent years have seen the development of [3D printing](#) for industrial purposes. The global market size for printers was valued at USD 47.29 billion during the year of 2021, and is expected to reach USD 68.81 billion, expanding at a CAGR of 4.8% during the forecast period of 2023-2031.

Mobile printing, rising demand for colour printing, packaging printing needs, development of market for entry level products and increasing demand for cloud computing and software serves as growth drivers for printing market. Rising economies like India, China and other Asia Pacific regions has a substantial upswing in printing sector. The shift from analog to digital as well as from black and white to colour models are the emerging tendencies in these sectors. The growth in printer market is observed as a result of increased demand for package printing. This increase is due to the expansion in e-commerce businesses.

The top key players of printer market is as follows:

- a) HP Inc.
- b) Canon Inc.
- c) Seiko Epson Corporation
- d) Brother Industries Ltd
- e) Xerox Corporations

- f) Fujifilm Holdings Corporation
- g) Konica Minolta Inc.
- h) Rolang DG Corporation
- i) Ricoh Company Ltd
- j) Fujitsu Ltd
- k) Panasonic Corporation
- l) Toshiba corporation

### ***Hewlett Packard***

Hewlett Packard, referred to as HP was the largest technological corporations, headquartered in Palo Alto, California, United States. The company dominates its presence in areas of computing, printing, digital imaging as well as for providing software and services.

January 1, 1939 marked its beginning with a precision audio oscillator, Model 200A being its first product that was launched. The company earned a global respect for variety of products. They hold the respect for introducing the first handheld scientific electronic calculator in the year of 1972 (HP-35), first handheld programmable in 1974 (HP-65), first alphanumeric, programmable, expandable in 1979 (HP 41C). Along with these, their oscilloscope, logic analyzers and remaining instruments have a fame for sturdiness and usability.

In 1984, HP launched inkjet as well as laser printers for desktops. These have later been developed into successful multifunctional products, most significant being single-unit printer/scanner/ copier/ fax machines. Printing mechanisms of LaserJet printer of HP depends on Canon's components which utilises technology developed by Xerox. The hardware, firmware and software is developed by HP to convert data into dots for mechanism to print.

"HP Home & Home Office Store" was rebranded from hpshopping.com in 2015, to operate as an independent subsidiary for selling its products online, directly to customers. Company has a prior history of acquisitions which are as follows:

- a) Apollo Computers in 1989
- b) Convex Computers in 1995,
- c) Compaq in 2002

HP has proven itself to be a major player in desktops, laptops and servers for many different markets.

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## **LITERATURE REVIEW**

[1] [Yi-Min Tao](#), [Hao Tang](#), [Xu Yang](#), [Xiao-Hong Chen](#) (2023) : Their research provides an approach that uses texture information and image quality factors to detect counterfeit stamp impressions. To compare printed versus hand-stamped impressions, the researchers employed statistical analysis, image processing analysis, and random selection. They discovered that, in regard to tiny features, printed impressions in true colour and printing of superior quality mode are comparable to hand-stamped prints, which could result in erroneous findings. Additionally, the technique offers an approach that can distinguish between hand-stamped and excellent printed imprints with respectable effectiveness, guaranteeing accurate determination.

[2] P. Sri Hari, S. Bhuvanewari (2023) This study examines how customers view Canon printers. Considering it discovers novel characteristics for Canon printers, it differs in comparison to other typical studies. The goal of the current study is to determine how customers view Canon printers. The city of Coimbatore served as the research's conducting location. It also communicates the degree of consumer pleasure. The analysis investigates the problem that consumers are facing.

[3] Dr. Muskan Nagi et al (2023) In particular, the research looks at how internet usage affects consumer brand preferences and attitude when it comes to laptop purchases. The study, which included 100 respondents from Chandigarh, India, used regression analysis and the t-test to demonstrate the substantial impact of social media on laptop choices.

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## **GLOBAL TRENDS DRIVING THE PRINT INDUSTRY**

### ***Consumer Preferences:***

Consumers now in today's era are disloyal to their brands, social media savvy, ethically aware, experience seekers and self-oriented. Digital Era has changed the perspective of market to "consumer is boss". Customers are allowed to disclose their experiences over the internet. Brands have to understand likes as well as dislikes of the customers during the launch of their new products and services. Brands must also provide their target market with what they require at what time and how they deliver it.

### ***Supply Chain***

With the advent of online shipping, the center of gravity of consumer packaging supply chain gets shifted towards order fulfilment issues-, efficiency in product picking, distance for deliveries, and satisfaction to customers. Brands should match supply and demand situations, reducing their supply chain that leads to lesser production, lesser shipping as well as waste and carbon emissions too.

### ***Time to market***

Consumers desire that their brands have to evolve faster like their social media feed. Brands have to significantly reproduce product lifecycle thereby hastening the time to hit store shelves. One has to embrace changes, experiment and get updated frequently with digital prints which goes from design to consumer in minimal time.

### ***Made to Order***

Customers have been the major critics and creators who demand lot more personalized services. Majority of the customers expect to purchase customized products as well as services. With such customization option, customers would be willing to pay more for such products and also be actively involved in such processes.

### ***Rediscovery Era***

Industrialization, and application of standardized parts and processes, blew away custom craft production on terms of cost and quality. This is actually changing now in a faster pace. Trend of premiumization has been bolstered by financial crisis, where consumers typically trade more during recession times. In emerging markets, this trend depicts and portrays sophistication as well as wealth.

### ***Brand Protection***

Generation of new business opportunities can be performed by offering solutions on a wider perspective to satisfy the protection needs of brands which are stringent in nature. Suitable business solutions could be like it should be harder to be copied, uniquely identify, mark and track.

### ***Sustainability***

Consumers, manufacturers as well as retailers demand more systems which are sustainable in meeting corporate social responsibility goals. Sustainability is been portrayed as a necessity to attract customers and protect their market share value. It becomes essential in packaging.

Brands can become bold, quirky, big or small with HP digital printing. Challenges become opportunities. Complex designs, multiple versions of products reaching the market fast, and online data regarding consumers and their experiences convert to opportunities for providing more to consumers. The technological innovations combine efficiency, excellence and reshape sustainable supply chain for brands. The just-in-time production by HP enables virtual warehousing so that brands can be printed where and when they are required to be. HP eliminates the consumption of time observed in conventional methods by providing digital solutions for print production, to shorten their delivery time. HP offers print service providers the flexibility to meet any type of commercial printing and packaging duties. Reducing the effects on environment due to printing is very much appreciated in business. HP is driven by sustainability. Their main intention is to create value for customers, by reducing waste, increase productivity as well as reduction in carbon footprint of printing. These seven global trends have been shaping the landscape of print production business. In the industry related to print service, growing business becomes crucial for its survival.

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## **OBJECTIVE**

- i) To study and understand factors affecting the preference of consumers while making a purchase of HP printers.
- ii) To analyze the different factors that affect the consumer preferences.

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## **METHODOLOGY**

Methodology includes data collection and data analysis. Primary data was collected from sample respondents with help of questionnaire. Sample of 150 responses was recorded. Questions primarily focused on the main contributing factors and their impact of influence and decision of a consumer while buying a HP printer. Secondary data was collected from websites, previous research papers.

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## **ANALYSIS AND INTERPRETATION**

### **Hypothesis:**

H0: There is no impact on factors on preference of HP printers.

H1: There is impact of atleast one factor on HP printers.

**Factor Analysis Output:**

The outputs related to factor analysis indicates sampling adequacy and sphericity of data.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.590
Bartlett's Test of Sphericity	Approx. Chi-Square	234.248
	df	21
	Sig.	.000

**Fig 1: KMO and Bartlett's test**

Communalities		
	Initial	Extraction
Wireless_printing_capability_is_essential_for_my_printer_choice	1.000	.754
Overall_cost_including_maintenance_and_ink	1.000	.675
Aesthetic_appeal_and_compactness	1.000	.538
Sensitive_to_noise_generated	1.000	.705
Availability_and_affordability_of_replacement_ink_cartridges	1.000	.891
Ability_of_printer_work_with_various_software	1.000	.743
Duplex_printing_feature	1.000	.529

Extraction Method: Principal Component Analysis.

**Fig 2: Communalities**

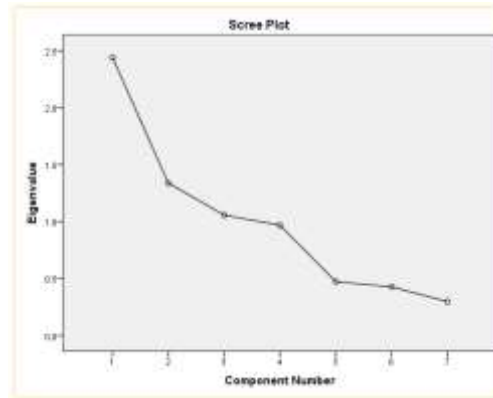
Kaiser-Meyer-Olkin Measure of sampling adequacy test is a measure of how well data is suitable for factor analysis. KMO value closer to 1 indicates better suitability for factor analysis. Here, the KMO value is 0.590 and is moderately acceptable.

Bartlett's test of Sphericity checks whether the variables in consideration are suitable for structure detection. The p value here is less than 0.05 indicating that the correlation matrix is not an identity matrix. Hence we can reject null hypothesis.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.440	34.863	34.863	2.440	34.863	34.863	2.422	34.598	34.598
2	1.338	19.111	53.975	1.338	19.111	53.975	1.302	18.606	53.204
3	1.057	15.097	69.072	1.057	15.097	69.072	1.111	15.868	69.072
4	.968	13.823	82.895						
5	.473	6.753	89.648						
6	.427	6.095	95.743						
7	.298	4.257	100.000						

Extraction Method: Principal Component Analysis.

**Fig 3: Total Variance explained**



**Fig 4: Scree Plot**

The 7 independent variables are grouped into 3 factors. The number of factors extracted can be identified from the Scree plot. The components having their Eigen values greater than 1 are considered to be factors. The total variance explained by all the 3 factors is 69.072%.

**Component Matrix<sup>a</sup>**

	Component		
	1	2	3
Wireless_printing_capability_is_essential_for_my_printer_choice	.606	.300	-.544
Overall_cost_including_maintenance_and_ink	-.484	.589	-.306
Aesthetic_appeal_and_compactness	.715	.152	
Sensitive_to_noise_generated	.803	-.244	
Availability_and_affordability_of_replacement_ink_cartridges		.531	.780
Ability_of_printer_work_with_various_software	.824	.186	.172
Duplex_printing_feature		.708	-.157

Extraction Method: Principal Component Analysis.  
a. 3 components extracted.

**Fig 5: Component Matrix**

**Rotated Component Matrix<sup>a</sup>**

	Component		
	1	2	3
Wireless_printing_capability_is_essential_for_my_printer_choice	.634	.430	-.409
Overall_cost_including_maintenance_and_ink	-.408	.714	
Aesthetic_appeal_and_compactness	.729		
Sensitive_to_noise_generated	.765	-.313	-.146
Availability_and_affordability_of_replacement_ink_cartridges		.152	.929
Ability_of_printer_work_with_various_software	.843		.180
Duplex_printing_feature	.144	.697	.147

Extraction Method: Principal Component Analysis.  
Rotation Method: Varimax with Kaiser Normalization.  
a. Rotation converged in 5 iterations.

**Fig 6: Rotated Component Matrix**

**Component Transformation Matrix**

Component	1	2	3
1	.992	-.112	-.065
2	.129	.901	.414
3	.012	-.419	.908

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

**Fig 7: Component Transformation Matrix**

Rotated component matrix indicates which all variables are loading on which factor, thus to know reliability of the factor we rotate the axis about.

According to these loadings we name the 3 factors extracted as follows:

- Factor 1: Integrated performance and user experience
- Factor 2: Cost efficiency and printing efficiency
- Factor 3: Ink cartridge availability and affordability

#### **Regression Output:**

Variables Entered/Removed <sup>a</sup>			
Model	Variables Entered	Variables Removed	Method
1	REGR factor score 3 for analysis 1, REGR factor score 2 for analysis 1, REGR factor score 1 for analysis 1 <sup>b</sup>	.	Enter

a. Dependent Variable: Preference  
b. All requested variables entered.

**Fig 8: Variables Entered/Removed****Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.308 <sup>a</sup>	.095	.076	.87820	2.043

a. Predictors: (Constant), REGR factor score 3 for analysis 1, REGR factor score 2 for analysis 1, REGR factor score 1 for analysis 1

b. Dependent Variable: Preference

**Fig 9: Model Summary**

The R squares value is 0.095 that is only 9.5% of the total variance of the preference to HP printers is being explained by the factors.

The Durbin Watson test value is 2.043 indicating there is no auto-correlation.

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.773	3	3.924	5.088	.002 <sup>b</sup>
	Residual	112.600	146	.771		
	Total	124.373	149			

a. Dependent Variable: Preference

b. Predictors: (Constant), REGR factor score 3 for analysis 1, REGR factor score 2 for analysis 1, REGR factor score 1 for analysis 1

**Fig 10: ANOVA table**

The Anova table depicts that the model is significant as p-value is 0.002 which is less than 0.05

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.253	.072		45.371	.000
	REGR factor score 1 for analysis 1	.212	.072	.232	2.952	.004
	REGR factor score 2 for analysis 1	-.014	.072	-.016	-.200	.842
	REGR factor score 3 for analysis 1	.184	.072	.201	2.552	.012

a. Dependent Variable: Preference

**Fig 11: Coefficients Table**

From the coefficient matrix, we can deduce that Factor 1 and Factor 3 are significant, Factor 2 is insignificant as its p value is greater than 0.05. Hence the independent variables : Wireless printing capability, Aesthetic appeal, Sensitivity to noise generation and Ability of printer to be integrated with various software of Factor 1 and Ink cartridge availability and affordability of Factor 3 have significant impact on preference of HP printers by consumers.

**Residuals Statistics<sup>a</sup>**

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.4899	3.8606	3.2533	.28109	150
Residual	-1.75529	1.72476	.00000	.86931	150
Std. Predicted Value	-2.716	2.160	.000	1.000	150
Std. Residual	-1.999	1.964	.000	.990	150

a. Dependent Variable: Preference

**Fig 12: Residual Statistics Tables**

The equation can be given by:

$$Y = 3.253 * \text{Constant} + 0.212 * \text{Factor 1} + 0.184 * \text{Factor 3} + \text{error}$$

Here,

Y → Preference for HP Printers

m1 → 0.212

m2 → 0.184

Intercept c → 3.253

## CONCLUSION

The research emphasizes on the variables having a grouped impact on the preferences of consumers on the use of HP printers. The model was observed to be significant and R squared value was 0.095. All the 7 independent variables were grouped into 3 factors and only 2 factors were significant. These

variables which are grouped under corresponding factors have significant impact on the consumer preferences. Here null hypothesis is rejected, thereby accepting the alternative hypothesis that at least one factor has an impact on preference of HP printers.

Concentrating on HP printers, the study provides insightful information on how consumers make decisions in the printer market. These elements may direct the creation of products and advertising plans, helping HP succeed in the cutthroat printer market.

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